The Dissertation Committee for Wei Zhang Certifies that this is the approved version of the following dissertation:

How Do Education and Religion Affect the Health and Well-Being of the Very Old in China?

Committee:

Christopher Ellison, Co-Supervisor

Catherine Ross, Co-Supervisor

Robert Hummer

Marc Musick

Graham McDougall

How Do Education and Religion Affect the Health and Well-Being of the Very Old in China?

by

Wei Zhang, B.A.; M.A.; M.S.

Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

May 2007

Dedication

This dissertation is devoted to my parents, my husband, and my grandparents.

Acknowledgements

First of all, I would like to thank my mentors— Prof. Ellison and Prof. Ross for their great support and guidance in my study at U.T., Austin. Prof. Ellison never hesitates to provide his best support in my research and studies. He can always pull out a long list of references directly from his memory whenever I have a research question and gives ovations for every little move I have made. I am also deeply thankful for Prof. Ross who helps me develop my dissertation topic in her class and teaches me how to cope with difficult encounters in research step by step with great patience. Their knowledge and personality are lifetime fortune for me. I am also very grateful to Prof. Hummer, Prof. Musick, and Prof. McDougall for their constructive and insightful comments in improving my research and their generous help in my academic career.

Finally I want to thank my parents, my husband, and my grandparents. This work is dedicated for them. I can never imagine a life without their constant support and love.

How Do Education and Religion Affect the Health and Well-Being of the Very Old in China?

Publication No._____

Wei Zhang, Ph.D.

The University of Texas at Austin, 2007

Supervisors: Christopher G. Ellison and Catherine E. Ross

A large body of empirical research has documented strong beneficial effects of educational attainment on a wide range of health outcomes. In addition, there has been growing interest in the links between religion and health, and some studies have suggested that the benefits of religious involvement on health are strongest for persons with low-to-moderate levels of education. To date, however, the bulk of this work has been conducted in the U.S. or other nations in the developed West. Although researchers have called for more comparative and cross-cultural studies on these topics, few if any studies have focused on the interplay of education, religion, and multiple health outcomes in China, particularly among its most elderly citizens. This project aims to address this gap in the research literature, with the following objectives: (1) to examine whether and how education is related to emotional and cognitive well-being, and reflects possible gender differences; (2) to explore whether and how religious participation is associated with various health indicators; and (3) to examine whether religious practice may complement or moderate the association between individual-level SES or community-

level SES and health in this distinctive population. To investigate these issues, I use data from the Chinese Healthy Longevity Survey, a nationwide survey of the oldest old adults in China; my analyses involve the 1998 baseline survey, as well as data from the 2000 and 2002 follow-up surveys. Findings suggest that: (1) education impacts emotional and cognitive well-being through different mechanisms; (2) the indirect effects of religion on health are primarily mediated by psychological resources and lifestyle, but not by social resources; (3) females report higher levels of religious participation and get more cognitive benefits from it than males; (4) individual-level SES is negatively associated with religious participation, whereas community-level SES is positively associated with religious participation; and (5) the beneficial effects of religion on psychological well-being are more pronounced for residents in poorer areas. The theoretical and policy implications of the findings are discussed and elaborated.

Table of Contents

List of Tables

List of Figures

INTRODUCTION

China, which is home to more than 1.3 billion or roughly two fifths of the world population, is aging at an extraordinarily rapid speed and on a large scale. This has results from the changing of family structure, increasing of life expectancy at birth, and especially the declining of fertility and mortality rates. Rapid aging is indicated in the large size as well as the fast increase in proportion of elderly population segment.

Population aging in China has three major characteristics. The first characteristic is its very large size of the elderly population (age 65 and above). In 1990, there were 65 million elderly Chinese. However, by the years of 2030 and 2050, there will be 232 million and 331 million elderly people in China respectively, according to the estimations by Zeng and Vaupel (1989) and Zeng (1994). Their projections are surprisingly consistent with the population forecast by the United Nations, which suggests that there will be 234.5 million and 333.6 million elders in China in 2030 and 2050, respectively (Population Division 1999b: 273). The astonishing coherence in the projections of the total number of the elderly in China, produced by different scholars at different times, confirms the huge increase of elderly Chinese in the middle of this century.

If the large size of the elderly population is only the reflection of the large population as a whole, the fast increase in proportion of the elderly population, would be more persuasive in describing the sensational population aging in China. In 1990, the proportion of elderly Chinese was only 6% (Liang et al. 1986; Ogawa 1988; Zeng 1989; Grigsby and Olshansky 1989; Zeng and Vaupel 1989; Vaupel and Zeng 1991; Zeng

1994), but this proportion is expected to be tripled or even fourfold in the first half of the 21st century. According to the estimations by Zeng and colleagues (1989, 1994, 2000), Chinese elderly would account for 15.8 percent and even 23.1 percent of the total population by 2030 and 2050, respectively. Again, these estimations are consistent with projections by the United Nations, which was conducted in 1999 and applied different methodologies. This further confirms the dramatic increase of the elderly population segment—the proportion of elderly population will be more than four times as high as in 1990. While it takes over one century or more for the majority of European countries to experience aging transition, for China, it is anticipated to take only a few decades. The proportion of the elderly Chinese will increase much faster than in almost every other country in the world. It is expected to take about 20 years for the elderly population to increase from 10 percent to 20 percent in China (2017-2037), compared to 23 years in Japan (1984-2007), 61 years in Germany (1951-2012), 64 years in Sweden (1947-2011), and 57 years in the United States (1971-2028) (Population Division 1999b).

The third characteristic of population aging in China is the even more extremely rapid increase of the oldest population segment, especially after 2020. While most younger elderly persons (less than 80 years old) are relatively healthy, the oldest old usually need great deal of help and consume large amounts of services and benefits. In contrast to the expected annual rate of increase in the proportion of the elderly population as a whole, which is 2.3 percent, the average annual increase rate of the oldest old is anticipated to be 2.5 percent from 1990 to 2050. According to a report by Zeng and George (2000), the percent share of the oldest old among the elderly population will be nearly tripled from 1990 to 2050, with an even huge leap from 2040 to 2050—the share increases by 10.6 percentage points. It is quite certain that the oldest old will increase

tremendously in this century and China will inevitably face severe social problems associated with its population aging.

Sophisticated estimations at different points of time indicate that although China is still a developing nation, it is aging on a large scale and at a rapid speed, with unique characteristics distinguishing it significantly from other developed nations. Looking back to Chinese history and policy evolvement, however, it is not hard to find out reasons for such a dramatic transition of population structure. Right after the establishment of the People's Republic of China (PRC), Chinese government and its major political leaders greatly encouraged big family and large population, assuming that more people equals to more power and more economic development. As a result, there came the 1950s and 1960s baby booms and these cohorts would fall right into the older, especially the oldest old category in the middle of this century—2040-2050.

Changes in the country's population structure are taking place hand in hand with changes in the structure of the Chinese family. Since late 1970s, China has undergone another tremendous demographic transition, with policy makers realizing the heavy burden of the big population and starting to carry out the one-child policy in China. As a result of this population control policy, the total fertility rate (TFR) of China declined from approximately 6 children per women before 1970 to about 2.6 children by the end of 1970s, and to slightly below replacement level today (Zeng and George 2000). With relatively a short period of time—approximately 10 years from 1970 to 1980, the TFR pattern of China joined the pattern of other developed nations such as United Kingdom, United States, and Japan (Yang 1988). Consequently, while the proportion of younger persons steadily declined due to tremendous drop of fertility rate, the large cohorts born during the first and second baby booms in the 1950s, 1960s and early 1970s will become the elderly in the first half of next century. This means that beginning with the current

generation of younger adults, couples will face the extremely difficult task of caring for four parents of old age. The ratio of workers to retired people will decline from about six to one now to about two to one by 2040 (French 2007).

The eloquent evidence and predictions provided above suggest that the extremely rapid population aging in China is inevitable and this process is likely to be accelerated by the further declines of mortality and fertility rate, and the increase of life expectancy. Given that the elderly, especially the oldest old, are the major consumers of goods, services, and health care in society, the increase of social burden and the subsequent severe social problems accompanying the population aging will likewise become unavoidable. What can we do in responding to such a rapid increase of elderly population? Some scholars suggested that one solution is to strengthen family support for the elderly by providing appropriate awards to the adult children who are willing to live with their elderly parents (Zeng and George 2000). Using family support is certainly an efficient way of dealing with problems associated with population aging when the improvement of social welfare and medical care are largely restricted by the economic development. However, with the continuation of the one-child policy, it is increasingly possible that one couple has to support two sets of parents and even grandparents, who, in addition, may live longer in the future. This will not only increase the cost of family care, but also likely to create inner-family or inter-generational conflicts, greatly undermining life quality.

Therefore, under different family structure, relying solely on family support for the elderly is not entirely practical. Some other strategies have to work as the supplements in order to establish a comprehensive and efficient health care system. The health and social consequences of population aging are well recognized by the government. They not only put forth related laws to reinforce the traditions of family

care, but also try to gradually transform a solely government financed health service system to a government subsidized one, following the change to a market economy. Meanwhile, much emphasis has been put on the prevention of chronic diseases. According to Woo and colleagues (2002), Chinese central government has carried out surveys (e.g., national health and nutrition surveys) to monitor health and nutrition status and to dissimilate public health messages. On the basis of the health information and under the cooperation of the different health related ministries in China, various community based health service models have started in cities as well as rural areas. By doing so, the general public is being introduced to the problems of population aging.

Although Chinese government has acknowledged the severe consequences of rapid population aging and started to address them in various public health policies and programs, the long-term and high quality of health care system for the elderly are still limited and will inevitably reach its saturation point (Kaneda, 2006) due to several reasons. First, on the family level, the continuation of the "one-child policy" and the corresponding "4-2-1 problem"[1] make family care for the elderly become increasingly difficult. Second, the macro-level outlook for health care spending is even worse. While the number of elderly in the population requiring care is growing, the size of the working-age population who pay much of the health care costs is shrinking. Furthermore, the rate of increase in health care costs has already exceeded the national economy and individual earnings (Lee 2004). All these difficulties call for the efforts of targeting at disease prevention and maintenance of function of the elderly involving lifestyle modification and positive image of aging promotion. This endeavor needs to go side by side with family care and government support.

[1] When the first generation of the one-child policy start reaching old age and retiring, they will face the need to care for two parents and often four grandparents without siblings with whom to share the responsibility, a problem sometimes referred to in China as the "4-2-1 problem."

In a nutshell, when family care, systems of formal care and service delivery are limited, it becomes increasingly imperative to identify the social institutions and processes that may directly contribute to the health and well-being of the elderly on the individual level, thereby perhaps, more or less reduce the need for major care provision on the macro level. Inspired by this particular concern and Western empirical findings, this dissertation, thereby, will primarily focus on the very old Chinese population and two major social factors—education and religion, in order to examine (1) whether these two factors play fundamental roles in maintaining or promoting health and well-being of the very old, and (2) how they, individually and interactively, promote good health if their salutary effects on well-being are clearly identified.

The beneficial effects of education on health and well-being are well documented in Western nations. Supported by various empirical studies in the U.S, Mirowsky and Ross (2003) conclude that education, acquired in earlier adulthood, accumulates advantages throughout the life course, thereby, has particular positive effects on health and well-being. According to them, education forms the subsequent social status, accumulates wealth, shapes healthy lifestyles and habits, and indicates human resources, all of which are directly and indirectly related to health promotion and maintenance. Therefore, education is not something that can be taken away; instead, it is the internalized abilities and resources that can be continuously reinforced by personal experience and continuous learning.

In this sense, it can be reasonably assumed that the above advantages and merits of education generalize. Well-educated elderly Chinese should be expected to be better off in health than their less educated counterparts. At the very beginning of the 20th century when the current oldest old Chinese were born and about to get schooling, China witnessed the fundamental reform in educational system, patterned after Japanese and

Western models. The exclusively male system of civil service examinations was eventually abolished. Following this, women's school enrollment started to increase and the gender gap in years of schooling began to narrow (Shu 2004).While the contents and formats of education became increasingly internationalized in China, the ways through which education shape individual abilities, universally found in the Western context, should be likewise identified in China within its most senior citizens. Elderly Chinese who did not catch up the modern education and had the traditional type of schooling may still be better off because some education is better than nothing. The abilities of writing, reading, communicating, and continuous learning distinguish them from the illiterate.

If the years of schooling of the current oldest old disperse widely, are generally low, and lack of uniformity, later generations, especially those who were educated in the post-Mao period, enjoy much higher levels of mass education with relatively less disparity and more uniformity. Zhou and colleagues (1998) identified four historical periods after the establishment of PRC that are momentous for mass education. The beginning period is the first decade after the 1949—1949-1959—when educational opportunities expanded exponentially in response to the increasing demand for an educated workforce. Following this, comes the second period—1960-1965—a time of economic contraction combined with economic disasters when educational opportunities at the senior high school and college levels declined. The third period, 1966-1977, experiences the Cultural Revolution, a time when educational processes and institutions were severely disrupted. The final post Mao period starting from 1978, witnesses the resumption of college entrance examinations, which signals a new beginning in China's educational system. From the above retrospection, we see that despite the short period of disruption in higher education, the overall educational system after PRC has experienced a considerable leap, following the fundamental educational revolution at the turn of 20th

century. The overall education level for both sexes improves dramatically. In the urban area, the average number of years of schooling jumped to 7 years for women and 9.5 years for men in 1949, in contrast to 1 year for women and 7 years for men in 1918 (Shu 2004). With the rapid increase of elementary and middle schools, enrollment in both rural and urban areas grew fast (China Education Yearbook 1984). Especially in urban China, female illiteracy rate dropped substantially from approximately 20 percent for those born in the 1930s to less than 5 percent for those born in the 1960s (Lavely et al. 1990; Research Institute 1991).

In sum, the educational system in China has primarily experienced two fundamental historical periods, with early 20th century seeing the creation of greater educational opportunities for both sexes, and the post-PRC period marking the tremendous escalation for both schools and enrollment. If education benefits health of the elderly, its salutary effects may be even more apparent for the younger generations with larger scales and higher levels of schooling. Therefore, focusing on education and its relation to health, one aim of this dissertation is to suggest another significance of education—disease prevention and health maintenance, a function that has long been neglected in China.

In addition to education, another popularly examined social factor in the West is religion. Although far from conclusive, mounting evidence based on congregational religions in the Western countries suggests the positive relationship between religious practice, service attendance in particular, and various health outcomes. Review of literature indicates that religion may enhance various aspects of well-being through ways of refining health lifestyle, promoting social integration and social support, offering psychological comfort via the establishment of divine relations, and providing meaning and existential coherence (Ellison 1991; Ellison and Levin 1998). As a result, religious

individuals, on average, enjoy better mental health, physical health, and longer life, in comparison with their less religious counterparts. For the elderly, who have retired from paid work and various life stages, religion and religious community become even more salient.

But the question is whether these well established explanatory mechanisms bridging Judeo-Christian religions and health hold true in China where the mainstream religion is non-congregational by nature. While critics have long been questioning the reliability of religion-health research, which relied heavily on behavioral religiosity such as service attendance, recent endeavors in this area have been put forth in applying content-based measures (e.g., personal spiritual experiences, spiritual well-being) and functional measures (e.g., meaning, coping, support) of religiousness in order to capture more aspects of religiosity or spirituality that might be related to individual health (Ellison and Levin 1998; Krause 2002; Idler et al. 2003). In response to this line of inquiry, increasing evidence supports that religion is more than service attendance and many aspects of religiousness are good for health. That is to say, without institutional boundary, religion still matters for health. These persuasive facts make it plausible to explore religion and health association in China where most religions have no clear sense of membership in a congregation as an anchoring point for personal or family religiousness and no regular collective worship or other ritual practices through which social ties can be developed and personal spirituality can be reinforced.

Like the older people in the West, elderly Chinese, on average, are more religious than their younger counterparts. Old age is common in many ways. It is usually characterized by withdrawing from various social roles, experiencing death of the loved ones, declines of health, and closely approaching towards the end of life, all of which may greatly undermine self-esteem and sense of personal control. At this very late stage

of life, what social processes may serve as the alternatives, to some extent, alleviating the pain of multiple losses? Religious practice is believed to be one of such alternatives. This partially explains why so many elderly Americans demonstrate that religion is very important or important in their lives. Similarly, in China, having seasonal fasting, practicing religious rituals, and worshipping ancestors, are generally led by its senior citizens. Interestingly, however, in the contemporary China, more and more young people than before start to emphasize religious practice. With its unique functions, the popularity of religion seems to have grown quite a bit nowadays in China.

If education and religion have individual effects on health and well-being, how do they interact to take effect? This is another issue deserves exploration. What's the socioeconomic profile of religious practice in China? Will the less educated and the poor be more religious and benefit more from religious practice? While some findings in the West providing confirmative answer to this question, little is known on this topic in China. Clearly, this is an area warrants further scrutiny. In order to get a comprehensive understanding, I applied two-level socioeconomic status (SES) in this dissertation: one is individual level SES such as education; the other is community level SES such as rural/urban residence and regional GDP per capita.

Accordingly, I divided this dissertation into three related but independent chapters. In the first chapter, I explored whether and how education is related to emotional well-being and cognitive functioning, and to possible gender differences in this process. Following this, the existence of religion's effects on various health outcomes was examined in the second chapter. Finally, in the third chapter, the interplay among religion, two levels of SES, health, and possible gender differences were studied. To investigate these issues, I used data from the Chinese Healthy Longevity Survey (CHLS),

a nationwide survey of the oldest old adults in (mainland) China; my analyses involved the 1998 baseline survey, as well as data from the 2000 and 2002 follow-ups.

Chapter 1: Education, Gender Differentials, and the Well-Being of the Very Old Chinese

ABSTRACT

Does education have a cumulative or persistent effect on well-being? If it does, does it vary by sex or what are the mechanisms linking them? These questions have seldom been explored in Asia among its very old people. Using the 1998-2002 Chinese Healthy Longevity Survey, this chapter reveals that: (1) Education has both short-term and long-term effects on emotional and cognitive well-being and life quality; (2) Economic conditions, psychosocial resources and healthy lifestyles mediate the education-health association; and (3) The association between educational attainment and cognitive well-being (or lack of cognitive decline) among the oldest old Chinese is stronger among women than men. This difference is explained by women's higher mean levels of engagement in daily activities and psychosocial resources. Therefore, this chapter contributes to the literature by (1) revealing the cumulative, or at least persistent, effects of education on emotional and cognitive well-being; (2) extending the Western findings into a new cultural setting with appropriate theoretical and operational alterations; and (3) encouraging Chinese policy makers to be aware of the long-term effects of education on health for its senior citizens.

INTRODUCTION

It is well established in the United States and other developed nations that education is positively associated with mental health, even after controls for age and other demographic characteristics. However, whether this association holds outside the U.S. for the very old Chinese remains largely unexamined and thus, is the focus of this chapter.

In the Western societies, well-educated people enjoy better psychological well-being than the poorly educated counterparts, as indicated by low levels of distress (Ross and Van Willigen 1997), anger (Schieman 2000), and life dissatisfaction (Ross and Van Willigen 1997). In contrast, depression and other mental health problems are usually overrepresented among adults with lower levels of education (Adler et al. 1994; Dohrenwend et al. 1992; Holzer et al. 1986; Link and Dohrenwend 1998; Neugebauer, Dohrenwend, and Dohrenwend 1980; Wheaton 1978). In terms of the explanatory mechanisms linking education and well-being, Ross and Wu (1995) suggest that better jobs and objective life conditions, richer social and psychological resources, and healthier lifestyles are their connections. Since the characteristics of education and three major factors linking education and well-being are part of social causation as opposed to social selection (Aneshensel 1992; Fos et al. 1985; Mirowsky and Ross 2003; Ross and Wu 1995; Turner et al. 1995), they are likely to vary across societies (Hraba et al. 1998). If this is the case, it will be worthwhile to revisit the education-health relationship in China where educational system, social conditions, political policies, traditions, and cultures are historically different from those in the developed nations.

In addition, some scholars suggest that the gap in various health outcomes tend to increase with age since education and the advantages it shapes accumulate (Ross and Wu 1996; Miech and Shanahan 2000). Therefore, health disparities may be persistent or even

enhanced across the life course. If this is also the case, education and mental health relationships should be found in late life among the very old.

Moreover, a recent study by Ross and Mirowsky (2006) reveals sex differences in the effect of education on depression. This is consistent with the resources substitution hypothesis, as opposed to the resources multiplication view. Accordingly, it is reasonable to expect that, in China, years of schooling benefits more for the elderly women (than for men) who occupy markedly inferior status due to lack of education and other social opportunities.

In a nutshell, this chapter is expected to extend Western theories and findings on education and health, gender differences into Chinese context among its very old citizens. I examine education and three aspects of health and well-being (e.g., distress, self-reported life quality, and cognitive functioning), and how education's effects vary by sex, in order to see if the effect of education generalizes and how it varies in different cultural setting.

The remainder of this chapter is organized as follows. I begin by summarizing theoretical arguments linking education and well-being, psychological well-being in particular. Relevant hypotheses concerning main and contingent effects are then tested using both cross-sectional and longitudinal data from the 1998-2002 Chinese Healthy Longevity Survey (CHLS), a nationwide sample of the oldest old Chinese. Finally, I review findings and discuss their implications for future research on education and mental health more generally.

THEORETICAL BACKGROUND

Education is the key component of SES (Sewell and Hauser 1980) and structures the other two —income and occupation (Ross and Wu 1995), so I use it as a proxy of SES. Education is insensitive to labor force status and income level, which makes it

relatively stable and particularly relevant in the study of very old people who are not working for pay. In addition, use of educational attainment also makes it easier to establish causal relationship since education is usually acquired in early adulthood and thus, less likely to be impaired by later mental health problems (Miech et al. 1999).

There is evidence that education reduces physical impairment, improves self-reported health and physical functioning, delays the onset of physical disability, and reduces the odds of dying among elderly Taiwanese (Beckett et al. 2002; Zimmer et al. 1998; Zimmer et al. 2002; Zimmer et al. 2004), although education's beneficial effect on physical health may not hold in other Asian countries like Thailand or the Philippines (Zimmer et al. 2004), or on mental health in Japan (Inaba et al. 2005). However, little is known about the association between education and psychological distress, life quality, and cognitive functioning among the very old Chinese.

Theories of why education benefits well-being imply that education will be beneficial in many contexts and among many age groups (Mirowsky and Ross 2003). In the following sections, I summarize three prominent explanations of why education improves well-being and propose that these explanations can be generalized into Chinese context and among the very old.

Education and Wealth Accumulation

In the Western developed nations, education indicates human capital and accumulates resources, which make the educated healthier. First of all, education shapes work, economic conditions, and wealth accumulation. Educated people are more likely to be employed, have higher income, enjoy psychologically fulfilling work, experience less economic hardships, and have better skills to efficiently solve economic problems when encounter, all of which have known effects on well-being (See Ross and Wu 1995; Ross and Mirowsky 1995 for reviews).

But when people are in their retirement stage, how would education make a difference in promoting or maintaining health and well-being through this proposed economic pathway? According to the particular situation in China, I argue that education takes effect on well-being through (1) types of job before age 60, and (2) wealth accumulation afterwards, which is manifested in terms of economic independence in late life. In China, whether or not one would have retirement salary and the amount of it depend heavily on the type of job during younger adulthood. On the other hand, due to the underdevelopment of social welfare and health care systems in China, Chinese tend to put extra money into the bank instead of spending or investigating it. This is especially true among the elderly, who would feel much safer to leave certain amount of money intact in case of emergency. As a result, compared to their poorer counterparts who may be constantly worrying about their bad economic situations, elderly Chinese of economic independence are more likely to enjoy higher levels of psychological comfort and better life quality.

Education, Abilities, and Resources

Education also accumulates resources and enhances individual abilities that are good to health (Ross and Wu 1995). According to Mirowsky and Ross (1998, 2003), education is the root cause of well-being because it indicates human capital—the cognitive skills and abilities that can be used to control and direct one's own life. The skills and abilities learned in school inhere in the person; they cannot be taken away because they are not external, like social ties or a job. An individual who acquires an education can use it to solve a wide range of problems because schooling builds skills and abilities on several levels of generality. On the most general level education teaches people to learn. It develops the ability to read, write, communicate, solve problems, think of ideas, and implement plans. It develops broadly useful skills like observing,

summarizing, synthesizing, interpreting, classifying, and so on. In school one encounters and solves problems that are progressively more difficult, complex, and subtle. The more years of schooling, the greater the cognitive skills characterized by flexible, rational, complex strategies of thinking. Education teaches people to think logically and rationally, see many sides of an issue, and analyze problems and solve them, which in turn, may develop more optimistic personality, which lower the risk of all-cause mortality (Friedman 2007).

Education also develops effective habits, behaviors, values, and attitudes such as dependability, judgment, motivation, effort, trust and confidence. In particular the process of learning creates confidence in the ability to solve problems. Education instills the habit of meeting problems with attention, thought, action, and perseverance. Apart from the value of the skills learned in school, the process of learning builds the confidence, motivation, and self-assurance needed to attempt to solve problems. Thus education increases effort, which like ability is a fundamental component of problem-solving (Wheaton, 1980).

The efforts and abilities of solving problems, in turn, increase sense of control, which is one of the most important psychological states that improve health through enhancing health-related behaviors and other physiological mechanisms. Although there are cultural differences in the patterns and emphases of education, the effects of education in shaping personal ability and resources could be universal. Therefore, it can be expected that for the elderly Chinese, every single year of schooling accounts because education initiates one's overall ability of continuing learning and development, which likely persists throughout the life course. With more information, knowledge, and resources in hand, death anxiety and fear of hardships are likely to be replaced by

positive psychological statuses such as optimisms and self direction, which are all good to health.

Education and Healthy Lifestyles

Education encourages healthy lifestyle such as more exercise, not smoking, and not drinking heavily—behaviors that prevent health deterioration among the elderly. There are consistent evidences in the US and China showing that in comparison with their poorly educated counterparts, more educated people are less likely to smoke, more likely to quit smoke, drinking moderately, and engage in physical activities, which decrease the risks of cardiovascular diseases, cancer, and respiratory diseases (Ross and Wu 1995; Wu et al. 2004). These diseases account for almost 80 percent of all deaths in China in 2005 (Wang et al. 2005).

Meanwhile, education is completed early in life. If it shapes well-being in late life, it may do so in part through activities engaged in by the elderly, which are influenced by their level of education. The better educated adults may engage in activities that are more intellectually stimulating than the activities of the poorly educated. Compared with the poorly educated, those with more education likely engage in activities that promote intellectual challenge and keep alive their cognitive skills. This may delay their cognitive decline and benefit their mental health in general. The better educated may also engage in activities that are socially integrated as well. Social activities may reduce distress directly and indirectly by way of improving cognitive and intellectual functioning (Arbuckle et al. 1986; Bassuk and Berkman 1999; Holtzman et al. 2004; Hultsch et al. 1999; Newson and Kemps 2005; Schaie 1983).

Once a coherent lifestyle with respect to active engagement has been established, it is likely to be maintained and kept throughout the life course. Among different activities elderly Chinese are likely to be engaged in, I pick those most popular in both

rural and urban areas such as gardening, watching t.v./listening to the radios, playing cards/mah-jong, and reading books or newspapers, and create an engagement index to average these activities. These activities are either socially integrated or cognitively stimulating to some extent. Thus, it is expected that they are good to cognitive and mental health of elderly Chinese. The preliminary correlation table suggests that people having more years of schooling are more likely to do garden, read books, watch t.v./listen to radios, and play cards, respectively, in comparison with the poorly educated ones.

The role of exercise playing in promoting health among elderly Chinese merits particular mentioning. One the one hand, it is regarded as one type of health behavior; one the other hand, it can be treated as a socially integrated activity because old Chinese tend to engage in community-based exercises. Usually, elderly Chinese get up very early in the morning, walk into the nearby gardens or parks, and practice simple movements together. Tai Chi[2], for example, with mixed elements of relaxation, balance, flexibility, strength, and meditation, is especially favored by Chinese elderly since it has the functions of relaxing and strengthening the muscular and nervous systems.

Taken together, education implies human capital, individual abilities, available resources, and healthy lifestyles, which internalize, amplify, and persist across life course, promoting well-being or delaying health declines in late life. I argue that these characteristics of education have universal implications and similar patterns would be found in China with cultural alterations. I summarize these ideas into the following

[2] Tai Chi is referred to as a moving meditation and it is a way of harmonizing body and mind dynamically. Many tales have been told about its origin, one of which says that about 800 years ago there was a certain elixir maker named Zhang Sanfeng who lived in the Wudang Mountains in Hubei Province, China. One night he dreamt that he was taught Chinese boxing by Great Emperor, after which he went about disseminating the art among the common people. Thus, Tai-Chi Chuan was said to have been presented by a deity and handed down by supernatural beings. In the past century, Tai-Chi Chuan underwent changes, with movements becoming more relaxed, smooth, even, and graceful like floating clouds and flowing streams. As a result, Tai-Chi Chuan has become one of the popular exercises with men, women, young and old alike.

conceptual models (See Figure 1. and Figure 2.), reflecting how education might directly and indirectly affect distress, life quality (in Figure 1) and cognitive functioning (in Figure 2) in China, and come up with hypotheses 1.1-1.2.

Gender Differences in Education in China

Current oldest population in China is an important and interesting case of evaluating relationships among education, sex differences, and well-being due to several reasons. First of all, women's social status in China is historically lower than that of men. This is indicated by women's extremely higher prevalence of illiteracy, their exclusion from economic roles, and their foot binding which extended well into the first half of the 20th century. However, the early 20th century, when the current oldest old Chinese were born or about to get schooling, witnessed the cutting-edge point of Chinese education revolution: the creation of greater educational opportunities for both sexes in urban China. Influenced by Western culture, the exclusively male system of civil service examinations were abolished (in 1905) and the modern educational system patterned on Japanese and Western models was established (in 1902) (Wang 1960; Cleverley 1991). As a result, urban women's school enrollment started to increase, thus gender gap in education began to narrow (Shu 2004). For example, the illiteracy rate for women who were born between 1910 and 1930 declined from 70 percent to 50 percent (Lavely et al. 1990). On the other hand, however, still more than 95 percent of rural women born at the same period of time were illiterate (Lavely et al. 1990). Thereby, while gender gap in the urban areas started to narrow down, it remains in the rural area. While urban women started to embrace modern ideas such as family reform and women's rights and play economic roles, rural women were still handicapped by housework, continuous pregnancy, and child rearing (David 1975, Buck 1937).

Collectively, the turn of 20th century was a historical turning point when education was at the first time, open to the public for both sexes in China, but at the same time, huge rural/urban and gender differences still remain. All these characteristics make the examination of education-health relationship and possible gender differences among elderly Chinese, the first generation to experience this fundamental social change, particularly interesting and significant.

While education benefits both sexes, it means much more for women than for men. According to resource substitution theory (Ross and Mirowsky 2006), resources substitute for each other. The presence of education makes the absence of others less harmful. The effect of education on health is, therefore, greater for women than for men because women have fewer alternatives. Using data of 1995 survey of US adults and the follow-ups, Ross and Mirowsky (2006) found empirical evidence, supporting this point of view: Depression decreases more steeply for women than for men as the level of education increases and the gender gap disappears among the persons with college degree or higher. In the contemporary U.S, women face more economic dependency and restricted opportunities in comparison with men (Bianchi and Spain, 1996; Reskin and Padavic 1994). Similarly, in China, despite the rapid increase of women's education level and economic status after the Communists came into power in 1949, particularly, after post-Mao period in 1978, gender difference still persists and there is little empirical evidence of big change (Zhou et al. 1998). This is especially the case in the rural areas where social transformations expand with lower pace than in the cities, and among the oldest old population whose education were acquired several decades ago. Given the similar disadvantaged social status of Chinese women, I expect that education and the resources and capital it shaped benefit women's health more and come up with the third hypothesis.

SUMMARY OF HYPOTHESES

Based on the theoretical ideas and empirical findings described above, I propose the following hypotheses.

Hypothesis 1.1: Education has both short-term and long-term effects on distress, self-reported low life quality, and cognitive functioning among the elderly Chinese.

Hypothesis 1.2: Education has both direct and indirect effects on well-being. Education's indirect effect is primarily through economic, psychosocial, and lifestyle mediators, all of which are expected to be negatively associated with distress, low life quality, but positively related to cognitive functioning.

Economic mediator:

(a) Occupation reputation before age 60.

(b) Current economic independency.

Psychological resources mediators:

(c) Optimism.

(d) Self-autonomy indicated by self-decision making.

Social resources and lifestyle mediators:

(e) Engaging in various social and individual activities.

(f) Smoking, drinking and exercising behaviors.

Hypothesis 1.3: Education benefits well-being more for women than for men and the proposed mediators (economic conditions, psycho-social resources, and lifestyles) and their interactions with sex partially explain this differential.

DATA

Data to test these ideas come from the 1998 Chinese Healthy Longevity Survey and the 2000 and 2002 follow-ups. The baseline survey contains 9,093 respondents aged 77 - 122. In 2000, 4,831 respondents remained and were re-interviewed with 3,368

respondents deceased and 894 lost to follow-up. In the third wave, there are 2,642 respondents who were first interviewed in 1998 and re-interviewed both in 2000 and 2002 with another 1,604 respondents dead and 585 lost to follow-up. The overall data sets are socially and economically diverse, which is consistent with the purpose of this study to investigate social inequality and emotional and cognitive disparities, although quite a lot of the old people are illiterate, which undermines the variability in levels of education a little bit. A couple of social stratification indicators such as professions before age 60 and current economic conditions are included in the survey, which facilitates the analysis. Likewise, the comprehensive coverage of the geographic provinces and municipalities (22 out of 31) in the survey adds an additional variability into the data set. Respondents were from 631 randomly selected counties and cities of the 22 provinces where Han Chinese are the majority and the total population of which is 980 million, 85.3 percent of the total population of China. The response rate is 88%. Assessment of the data reliability have been conducted and been found to be of high quality. Please refer to Yi et al. (2001) and Yi and Vaupel (2002) for details about the data, its quality, calculation of sampling weights, and initial analyses.

MEASURES

Dependent Variables

Distress. Psychological distress is measured by a 4-item index. Respondents were asked: “how often do you feel 1) fearful or anxious; 2) lonely and isolated; 3) useless; and 4) as happy as younger? “Responses to the first 3 distress items were coded never (1), seldom (2), sometimes (3), often (4) or always (5), and responses to feeling happy were coded in reverse. The index is the mean response to the 4 items, scored 1 - 4. All items load on a single factor above .4; the alpha reliability is .55 (.67 in 2000 and .68 in

2002); and mean is 2.64 (2.35 in 2000; 2.45 in 2002), with a standard deviation of .63 in 1998 (.75 in 2000 and .82 in 2002).

Self-Reported Low Life Quality. Respondents were asked to self-evaluate their life quality, and responses to this question are coded very good (1), good (2), so so (3), bad (4), and very bad (5). Therefore, high score reflects low self-reported life quality. The sample mean and deviation in 1998 are 2.11 (2.19 in 2000; 2.33 in 2002) and .73 (.83 in 2000; .86 in 2002), respectively.

Cognitive Functioning. Cognitive functioning is measured by a 24-item (See Table 1.1) index from the Mini-Mental State Examination—MMSE (Folstein, Folstain, and McHugh 1975). The MMSE has been used extensively to measure the cognitive functioning of older adults across cultures, including Chinese; and it has been found to be a valid measure of cognition among Chinese population. However, the Chinese version of MMSE adopts some appropriate adjustments to make the questions more understandable and answerable among ordinary oldest old Chinese, the majority of whom are illiterate (Yi and Vaupel, 2002). For instance, the Chinese MMSE asks respondents to name as many foods as possible (in one minute) instead of writing a sentence, which is a quite difficult task for the elderly. Overall, respondents were asked by 5 orientation related questions (naming the current time, animal year, season, festival, and county), one naming foods question, 6 word recall questions (3 words are mentioned and respondents are asked to repeat them two times), 5 calculations questions (respondents are asked to subtract 3 from 20, then 3 from the previous resulting, and so on), 3 language questions (repeating a sentence and naming simple items such as pen and watch that are shown to the respondents), 1 drawing question, and 3 comprehension questions (respondents are asked to take paper in their right hand, fold it, and then put it on the floor). Responses to the questions were coded wrong (0), correct (1). Recommended in the literature, “Not

able to answer" item was coded "0" (Zhang 2006). Then a continuous measure is calculated by scoring one point for each correct answer. Therefore, it is a sum response to the 24 times, scored 0-30. All items load on a single factor above .5; the alpha reliability is .91 (.90 in 2000 and .89 in 2002); and mean is 21.11(20.41 in 2000 and 19.60 in 2002), with a standard deviation of 8.98 (8.79 in 2000 and 9.04 in 2002) in 1998.

Independent Variables

Education. Education is measured by years of former schooling completed.

Economic Conditions. Occupational status before age 60 and current economic status are used as economic condition indictors. I created occupational status by dividing professions into five ordinal categories with higher scores reflecting greater demanding in education, trainings, skills, and abilities: Governmental, institutional or managerial personnel and professional or technical personnel were coded 5 with their highest job security, welfare, reputation, authority, and autonomy. Military personal and others were coded 4; housewives coded "3"; commercial or service worker, industrial worker coded 2. Agriculture, forest, animal husbandry, fishery worker and house workers characterized by job insecurity, low welfare, monotony, and exclusion of decision-making were coded 1. Current economic independence is measured by asking respondents, "What is your main source of financial support?" Economic independence is scored one if the respondent answered either their own work or retirement wage. Economic independence is scored zero if the respondent answered spouse, children, grandchildren, other relatives, local government or community, or others. Over nineteen percent of the sample reported economic independence. Economic independence may capture the essence of why economic well-being affects psychological well-being among the elderly. Although not ideal, it is a better than income as an indicator of economic well-being since most very old people are not working for pay, and wealth may be difficult to measure.

Stressors. Loss of spouse is measured by (1) v.s. all the others (0). Likewise, loss of family care when sick is measured by (1) v.s. all the others (0).

Psychological Resources. Optimism item asked respondents about: "how often do you look at the bright site of the things?" Responses to this item were coded never (1), seldom (2), sometimes (3), often (4) or always (5). The mean and standard deviation of optimism in 1998 are 3.92 (3.87 in 2000) and 0.81 (.70 in 2000), respectively. Self-decision making is measured by question: "how often do you make own decision?" Responses were coded in an increase (1-5) manner such that the high score means more self-directed. In 1998, the sample mean and standard deviation of decision making is 3.53 (3.63 in 2000) and 1.03 (1.16 in 2000).

Engagement. Engagement in the daily activities is created by the following four items: gardening, reading, watching t.v. or listening to the radio, and playing cards or mah-jong. Responses were coded never (1), sometimes (2), almost everyday (3). I averaged responses to create the index (α =.61 in 1998; α =.60 in 2000) with mean 1.33 (1.35 in 2000) and standard deviation .41(.42 in 2000) in 1998.

Lifestyles. Exercise is measured in response to the question: "do you exercise at present?" It is scored no (0) vs. yes (1). (27% and 55% of the sample reported exercising in 1998 and 2000, respectively). Similarly, smoking is measured in response to the question: "do you smoke at present?" It was recoded no (0) vs. yes (1) and around 17% (16% in 2000) of the sample was smokers in 1998. Heavy drinking is determined by the following three questions: "do you drink alcohol at the present time? If drink, how much per day on average do you drink? And what kind of alcohol do you mainly drink?" The measurement unit employed to gauge the amount of drinking is "liang", which is around 50 grams and it is widely used as a unit to measure alcohol consumption in China. The response categories for the types of drink are liquor, wine, and rice wine. Heavy drinkers

(coded as 1) are identified from drinking more than two liang (100 gram) of liquor, or six liang (300 gram) of wine, or 8 liang (400) of rice wine per day; otherwise, the subjects is coded as 0.

Other control measures. Age is in years (average age = 92). Gender was coded 0 = male and 1 = female, and 60% of the sample is female in 1998. Ethnicity was coded 0 for minorities, and 1 for Han majority, and 92.8% of the sample was Han at baseline. I also used a dummy variable to contrast married persons (coded 1) with their unmarried counterparts (coded 0), and another dummy variable to compare urban (coded 1) with rural residents (coded 0).

RESULTS

The findings from this study are organized in two sections. The examination of sample attrition on the study findings is discussed first. Following this, the substantive results are presented.

Effects of sample Attrition

Given that a number of subjects were either dead (N=3368) or lost to follow up (N=894) in the second wave interview, my sample size (N=4831) reduces almost 47%. This huge sample attrition deserves close examination since the loss of participants may result in sample selection bias (SSB) if those who remain differ significantly from the population they are supposed to represent. Although it is difficult to explore this problem precisely, some preliminary insights may be obtained by comparing the characteristics of respondents in wave 1 with those of respondents who remained in wave 2, to see if respondents who were lost or dead differ significantly from those who remained. To implement this strategy, I create two dummy variables to reflect either the lost or the dead in comparison with the persistent participants. Then, I use logistic regression to regress

these binary outcomes on the wave 1 measures such as age, gender, ethnicity, residence, education, occupation status, economic independency, psycho-social resources, lifestyle variables, distress, cognitive functioning and low life quality. If any of the wave 1 measures are associated significantly with this dummy variable, it would be reasonable to assume that the sample attrition did not occur randomly.

Findings from the logistic regressions reveal that sample attrition did not occur in a random manner. Those subjects who died some time between 1998 and 2000 are more likely to be the elderly with advanced ages, unmarried, males, and individuals with less engagement in various activities, higher levels of distress, and lower levels of cognitive functioning. Importantly, however, education does not predict death across waves of survey; this keeps enough variability of years of schooling in the remaining sample and facilitates the follow-up analyses on its effects on change of health status. Nevertheless, those respondents who were lost to follow up are likely to be the highly educated, urban residents, and individuals with lower levels of cognitive functioning.

I follow the same procedure to check the sample attrition from 2000 to 2002. During this period, 2189 out of 4832 (sample size of wave 2) of the sample were either dead (N=1604) or lost (N=585) to follow up. Those subjects who withdrew from the third wave or died between 2000 and 2002 are much more likely to be older, urban residents, unmarried, males, individual with lower engagement and lower cognitive functioning.

Readers should bear this in mind when generalizing results.

Substantive Findings

In order to examine the short-term and long-term effects of education on various indicators of well-being and the mechanisms linking them, I run the sequential OLS regressions by adding proposed mediators into equation step by step. Detailed cross-sectional and longitudinal analyses with respect to different aspect of well-being are

provided. For indicators of emotional problems—psychological distress and low reported life quality, I present total association between education and dependent variable of interest, adjusting for sociodemographics in equation 1. Occupational reputation before age 60 and current economic independence are then added into equations 2 and 3 in a sequential order. Psychological resources and lifestyle variables are integrated in equation 4 and 5, respectively. When cognitive well-being is applied, a significant gender difference in the effect of education is found. Therefore the corresponding sex-by-education and sex by mediator interactions are included into the models to closely gauge this differential.

In order to check the consistency and stability of the proposed relationships, I examine the change of health status within two periods of time. Correspondingly, the left-hand side of the longitudinal tables includes longitudinal results of wave 1 and wave 2 (1998-2000 with 1998 as baseline), and the right-hand side the tables are findings from wave 2 and wave 3 (2000-2002 with 2000 as baseline).

Education and Psychological Distress

Table 1.2 presents the cross-sectional net effects of education and covariates on distress. In general, females, minorities, rural residents, and the unmarried are more likely to report higher levels of distress than males, Han, urban residents and the married. Most importantly, well-educated elderly feel significantly less distressful than do elderly with low levels of education ($b=-.017$, $p<.001$), which is consistent with Western finding. In addition, the proposed mediators reduce the effect of education on distress by more than 82 percent, making it statistically insignificant in model 5 ($b=-.003$, $p>.1$). Among different set of mediators, psychological resources and lifestyle indicators stand out and greatly increase the adjusted R^2. They also mediate much of the economic conditions' effects on distress. Collectively, these findings imply that even in late life, education is

still significantly associated with distress, but its effect is more likely to go through psychological and lifestyle channels than economic conditions whose effects on distress are much more salient among younger adults.

Table 1.3 provides longitudinal evidence, which confirms education's persistent effects on distress. No matter what year (either 1998 or 2000) is set as the baseline, the general patterns of the net effects of education, covariates, and mediators on change of distress are quite consistent across models: Controlling for distress at baseline, males and urban residents have lower levels of distress than females and rural residents at second wave; Education's effects on distress at later waves are still significant, although its coefficient drops a little bit in 2000-2002 models; And all the proposed mediators account for certain amount of education's effect on change of distress, although their importance varies. Meanwhile, loss of social connections such as spouse or family care during study period is also a strong predictor of change of distress over time. Taken as a whole, the proposed predictors account for over 10 percent of the variation in change of distress (R^2=.118 for model 5 of 1998-2000 and R^2=.133 for model 5 of 2000-2002).

Taken together, education's persistent effect on distress and change of distress, and how it works are generally consistent with expectations. Thus, one third of the hypothesis 1.1 and 1.2—education and distress part, is supported by the data.

Education and Life Quality

Next, I turn to the assessment of education's effect on the second indicator of well-being—self-reported low life quality, based on models in Table 1.4 and 1.5. Table 1.4 reveals the significant cross-sectional relationship. Once again, the more educated are better off in terms of self-reported life quality (b=-.013, p<.001). Different from the results in Table 1.2, however, economic conditions are the most salient among sets of mediators, which reduce education's effect on life quality by 48 percent or so. As for the

psychological resources and lifestyle indicators, although they do not directly reduce education's effect, they mediate much of the effect of economic conditions on life quality. Except for the huge rural/urban (b=-.141, p<.001) and modest ethnicity (b=-.083, p<.01) differentials, no other sociodemographic disparities in low life quality are found.

Longitudinal findings in Table 1.5 are generally consistent with cross-sectional patterns with a few exceptions: (1) Although it is still significant at .05 level, education's long term effects on life quality are truncated in both magnitude and significance; (2) When examining over time, indicators of economic condition stand out as the most influential mediator although other psycho-social resources explain quite a bit of its effect on life quality; and (3) Loss of social connections, especially family care, is a strong predicator of decline of life quality given that the average level of life quality decreases cross waves in the data.

Put together, education has both short-term and long-term effects on life quality and the most effects of education are mediated by economic conditions, much of whose effects, however, are mostly accounted for by the proposed psychosocial factors. Thereby, another one third of hypothesis 1.1 and 1.2—education and self-reported life quality—is supported by the data.

Education, Sex Differentials, and Cognitive Functioning

Table 1.6 reveals significant interaction of education and sex in their estimated effects on cognitive functioning, which is consistent with resource substitution theory and Western findings. Specifically, Figure 1.3 suggests that the association of education and cognitive functioning is more positive for women, when adjusting for the sociodemographic variables. By calculation, in model 2 of Table 1.6, the positive slope of cognitive functioning with respect to education is approximately 2.47 times steeper for females than for males ((.110+.162) / (.110) = 2.47). Apparently, education's beneficial

effect on cognitive functioning is much larger for females than for males (b=.162, p<.001). And the gender gap in cognitive functioning is gradually closing with increase of education: gender difference becomes insignificant or even disappears at higher levels of education. Therefore, years of schooling are associated positively with cognitive functioning for both sexes, but more for females than for males.

Importantly, the hypothetical mediators and some of their interactions with sex mediate the majority of effects of interaction between education and sex. It appears that not only education itself, but also the key mediators shaped by it favor more for women than for men. Main findings are summarized as follows: First, although economic independence itself does not have significant net effects (Model 3), it interacts with sex to benefit cognitive functioning (Model 4), which reduces the coefficient of sex-by-education interaction about 30.1 percent. Second, psychological resources are added in model 5. Both optimism (b=1.091, p<.001) and making own-decision (b=.538, p<.001) are strongly associated with cognitive functioning and they reduce the model 2 sex-by-education coefficient by another 4 percent. Third, in model 6, I add adjustment for series of lifestyle variables such as engagement, smoke, heavy drink, and exercise, all of which, except for heavy drink have significant estimated effects, reducing sex-by-education coefficient by an additional 32 percent and making it insignificant (b=.074, p>.1). Interestingly, however, smoking does not seem to harm cognitive ability and this unexpected finding deserves further scrutiny. Model 7 adds adjustments for the interactions of sex by engagement and sex by exercise. The significant and positive interaction terms (b=1.725, p<.001; b=.936, p<.01) indicate a steeper positive slope of cognitive functioning with respect to engagement and exercise for women than for men. Collectively, model 7's full set of adjustments almost fully explain the sex-by-education interaction effect (b=-.026, p>.10).

In order to examine whether education's effect on the key mediators differ significantly across sex, I construct Table 1.7 and Figure 1.4. Table 1.7 implies that education and sex interact in their effects on predicting engagement and self-decision making: the effects of education on these two mediators are all greater for women (b=.004, p<.1; b=.015, p<.05) than for men. This is further illustrated in figure 1.4 where we notice the steeper slopes of engagement and decision making with respect to education for women—1.1 times steeper for engagement and 2.3 times steeper for self-decision making. With sex differential in the effects of education on cognitive functioning being found, hypothesis 1.3 is partially supported by the data.

Although sex differential pattern is not found longitudinally, education and some of its key mediators are still shown as significant predictors of change in cognitive functioning (See Table 1.8). Much of education's effects on the decline in cognitive functioning (since the average cognitive level declines over time in this data set) are mediated by economic independence, whose effects, are partially explained by psychological resources and healthy lifestyles. In addition, life stressors such as loss of family care (1998-2000) or loss of spouse (2000-2002) also appears to take cognitive toll over time. Taken together, the proposed predictors account for over 20 percent of the variation in change of cognitive status (R^2=.267 in model 5 of 1998-2000 and R^2=.213 in model 5 of 2000-2002). With evidence of education and cognitive functioning association, hypothesis 1.1 and 1.2 is fully supported by the data.

Although the estimated net effects of covariates are not the primary focus of this study, several patterns merit brief mentioning. In the cross-sectional models, in addition to education and its mediators which are associated positively with cognitive ability, low cognitive status is especially prevalent among oldest old with advanced ages and among

rural residents. In the longitudinal models, however, only age and sex reliably predict changes in cognitive decline over 1998-2000 or 2000-2002 study period.

Summary of Results

In sum, education predicts emotional and cognitive well-being although the ways through which education takes effect vary from model to model. While psycho-social resources are more important in their association with distress, economic conditions are more relevant to self-reported life quality and cognitive functioning. In addition, there are sex differentials in the effects of education on cognitive functioning, and much of the effects of sex-by-education interaction are accounted for by the proposed mediators and their interactions with sex. Moreover, for the oldest old, loss of social connections, especially family care seems extremely detrimental, which erodes well-being over time.

DISCUSSION

Beneficial effects of education on health and well-being are well documented in the US and other parts of the developed West, but whether these relationships hold true outside the West for the very old is not well examined. This chapter studies this neglected topic in China among its oldest old, thereby, contributes to the literature in at least four ways: (1) by using data from longitudinal surveys of the oldest old Chinese; (2) by applying multiple indicators of well-being; (3) by examining accumulative, or at least, persistent effects of education on well-being; and (4) by explaining variations in the effects of education on well-being by sex.

First, I see that the better educated elderly Chinese have lower levels of distress, higher levels of self-reported life quality and cognitive functioning. Even though everyone in this sample is over 77 and their average educational attainment is very low, education still matters for their well-being. This additional piece of evidence reveals that

educational gap in health does not disappear at all in such a late life stage when work, income, and many other aspects of economic conditions are no longer applicable and hard to be measured. Education means something that can be transferred into personal characteristics and abilities, which accumulate across life and can never be taken away. Therefore, by focusing on this long neglected but rapidly increasing population segment, my findings add to the existing body of knowledge concerning education and its links with well-being. In particular, they offer important confirmation that the effects of education on well-being may be persistent cross life course. That is to say, within another part of the world, under different social and cultural systems, education is still one of the powerful indicators of well-being.

Second, although the average age in this sample is 92, and the average years of schooling is only 1.8 years with most of people in this sample having not been in school for over 80 years, something about their current economic conditions, psychological resources, and their daily activities still appears to be structured by education. Even one more year of schooling accounts for the health difference, which is explained by their current economic conditions, availability of psych-social resources, and lifestyles (Ross and Wu 1995). Although I did not fully apply the popularly used mediators in the West, I use the appropriate equivalents to make them the best fit in China among the very old. For example, occupational status before age 60 and current economic independence are applied as the indicators of economic well-being. In addition, I integrate some additional mediators which are unique in China and are likely to be structured by education. For instance, I use engagement index as an important component of lifestyle, comprising popularly practiced activities such as playing cards/mah-jong, watching t.v./listening to the radio, reading, and gardening. These proposed mediators are positively correlated with education but negatively associated with health problems. With proper theoretical

and operational alterations, education and health relationship is revisited within an Asian context.

Third, three aspects of well-being are examined in this chapter in order to get a comprehensive picture of the salutary effects of education on well-being. The data suggest that no matter what health indicator is applied; education is always significantly associated with it. The longitudinal findings are particularly essential because they are important prerequisites for establishing causality. Therefore, my findings present important confirmation that education has long-term effects on, in addition to cross-sectional association with, well-being. Although the proposed mediators are all associated positively with well-being, their influence, however, varies cross dependent variables: While psychological resources are more pronounced in affecting distress, economic conditions affect life quality and cognitive functioning more, but the effects of healthy lifestyles, especially engagement, seems to be equally influential across models. This makes sense: Distress, self-reported life quality, and cognitive function are all measures of well-being, but they gauge different aspects of life. Cognitive status, one type of self-reported well-being (Andrew and McKennell 1979) indicated by cognitive functioning and life satisfaction tap more of economic life than psychological status such as distress, which is more of “affectively orientated”.

Fourth, the significant sex by education interaction reveals gender difference in the effects of education on cognitive functioning. And much of this difference is explained by the proposed mediators and their interactions with sex. Therefore, not only education itself, but also the social-psychological resources and health lifestyles structured by it benefit more for women than for men. This favors resource substitution over resource multiplication view in the U.S. Lack of other socioeconomic resources makes the presence of alternative particularly important and powerful. Thus, in order to

close gender gap in social status and health, decreasing education disparity is one of the most efficient ways. Unfortunately, however, no similar sex differentials of education on distress and life quality are found. Hence, my third hypothesis is not fully supported by the data. Why this is the case and whether this is true for younger populations deserve further explorations. But my guess is that this difference may partially due to the characteristics of the measures. While cognitive functioning is more of a objective evaluation, distress or self-reported life quality are more of subjective perception of well-being, which is, according to Andrews and Mckennell, the "from-the-heart" component of the attitude, thereby, are relatively unstable and influenced heavily by culture and individual experience.

Although this study provides answers to several significant questions, future research is needed along several lines. First, it will be more valuable if sophisticated measures on psychological distress, social support, and sense of personal control are available in the future surveys. For instance, distress in this study is a four-item index. Although it catches both depression and anxiety symptoms and has reasonable reliability, it is relatively rough, not as comprehensive and precise as Western distress measure. Therefore, future improved measures are greatly needed not only to increase the reliability of measures themselves, but also to facilitate cross-culture comparisons. When we are really talking about the same constructs, the universal understanding of social facts will be possibly reached.

Second, in addition to the measurement drawbacks, selection bias is another issue. This is a sample of extremely old Chinese who have survived the political turmoil and numerous wars, one of the most difficult historical periods in China. They have to be psychologically and physically strong enough to live long and eventually be included in this study. As a result, they may not fully represent their generations or cohorts.

Meanwhile, these elderly also belong to the critical generations who have witnessed the fundamental social transitions in Chinese society, including the establishment of PRC and educational reforms. Focusing on this group of people has particular meanings, but on the other hand, they may be too special to represent the contemporary populations in China. All these potential shortcomings should be kept in mind when generalizing results.

Finally, although longitudinal data have various advantages over cross-sectional data, the following questions remain unclear: Whether the effects on education on health are ccumulative or not? Will health disparities shaped by education be divergent, convergent, or constant over time? What is the impact trajectory of education? Does its impact change over time? If it does, will its importance increase, decrease or remain constant over the life course? In order to fully answer these questions, more waves of data over longer period of time are essential. In the contemporary China, the rapid and large scale improvement of education coexists with the persistent gender and regional differences, making China an ideal case for further explorations on these topics.

In sum, although there is much additional work to be done in the future, this study makes a significant contribution to the knowledge on education and health by testing relationships between education and multiple indicators of well-being within Asian context among its oldest population. The persistent and robust effects of education on these health indicators suggest the universal benefits of education, although the ways through which it takes effect varies in the different cultural setting. These findings have important social implications. On the individual level, getting more years of schooling increases chances of being healthy; on the society level, investigating more in education leads to long-term rewards and closes SES and gender gaps in health disparities, thus, alleviates the increasing burden of family care for the elderly to some extent.

Chapter 2: How Does Religion Benefit Health of the Very Old Chinese?

ABSTRACT

The positive association between religion, service attendance in particular, and a wide range of health outcomes is well established in the Western Judeo-Christian societies, but whether this association holds for the Asian society among its very old is not. Using 1998-2000 longitudinal data of Chinese Healthy Longevity Survey (CHLS), this study not only presents the profile of religious practice among the oldest old in China, but also reveals the salutary effects of religion on health and survival. And the ways through which religion exerts positive effects on health are different in China, as compared with the US (or other western societies): While psychosocial resources and health lifestyles mediate much of the religion-health association in these data, social connectivity—a significant mediating factor among the congregational religions of the West—does not seem to be involved here. In addition to the indirect effects described above, religious participation also has strong direct effects on health, especially on cognitive functioning and physical health. These findings bridge the literature gaps: (1) by confirming the salutary effects of religion on well-being, which have largely been examined in the Western Judeo-Christian societies; (2) by disclosing the distinguished mechanisms linking religion and health among the non-congregational religious traditions that are prevalent in China; and (3) by gauging the nuances of religious effects on a variety of health outcomes: mental health, physical health, and survival.

INTRODUCTION

Over the past decades, a growing literature has examined relationship between individual religious involvement and health, including mental and physical health and mortality risk. Although this work is far from conclusive, mounting evidence indicates that some aspects of religiousness and spirituality have salutary effects on a wide range of health and well-being outcomes (Koenig, McCullough, and Larson 2001; Smith, McCullough, and Poll 2003; Hummer et al. 2004). This is especially the case for older adults: Religious ones tend to enjoy better physical and mental health than their less religious counterparts (Koenig 1998; Levin 1996). Many—perhaps most—studies in this area, however, have been conducted in the Western Judeo-Christian societies where congregational religions are dominant and service attendance is the most frequently used indicator of religiousness. Except for some studies in Japan (Krause et al. 1999), less is known whether religion and health patterns are applied for societies where other religious traditions have been dominant—for example, in the Confucian societies like mainland China.

In many ways, testing the association and consistency of religion and well-being in China is an urgent priority. First, the changing of scholarship of religious research[3] (from a completely anti-religion and atheism perspective to a more objective and scientific approach) makes China become one of the most religious countries in the world at the turn of the 21st century (Yang 2004). Relaxed from political restrictions, atheists are increasingly replaced by religionists of different traditions. According to a recent survey on religious life in China (Sun 2007), approximately one third of the Chinese population (16 years and older) are involved in religious activities of one form or another,

[3] According to Yang (2004), under the rule of the Chinese Communist Party, the scholarship of religious research in China has changed from virtually nonexistence in the first thirty years after the establishment of People's Republic of China (1949-1979) to flourishing in the reform era (1979-present).

and only less than 15% identify themselves as atheists. Second, although the number of Christians increases steadily, Chinese traditional religions such as Buddhists, Taoism, and various folk religions are still dominant. This makes China an ideal case for extending Western theories and findings on religion and health association in a non-congregational setting. Third, China is now aging at an extremely rapid speed and on a large scale. According to the projections by the United Nation (French 2007), in the middle of this century, there will be approximately 450 million, that is, one third of the Chinese population, becoming retirees. Meanwhile, the change of population structure goes hand in hand with the change of family structure, which is indicated by the one-child policy starting from 1980. This dilemma makes social care and family care for the aging population become difficult, thus, calls of the acknowledgment of social processes and institutions such as religion in promoting individual health. Collectively, in the contemporary China, it is both imperative and feasible to examine religion and health connections for both academics and policymakers in China and abroad.

Religion benefits health, but its perceived importance, as well as its effects, vary across social groups. For older adults who have experienced dramatic life transitions and difficulties, religion becomes increasingly important and meaningful, thus, its effects are the most salient. For instance, in the Western Christian society, religion is regarded as one of the most imperative components of older people's life. According to the national data from Princeton Religion Research Center, in the U.S., elderly people are highly likely to say religion is "very important" in their life (76%), compared with 44% percent of those under 30. Gallup polls and Barna surveys also indicate that 53% of persons age 65 or older attend religious services at least weekly, over 60% read Bible scriptures during a typical week, and 90% pray. Parallel to the Americans, elderly Chinese who

have experienced similar life transitions and difficulties are likely to value religion in a roughly same manner.

In a nutshell, this study investigates the association between religious participation and mental health, physical health, and survival among elderly Chinese, with an intention to enrich theories and findings on religion and health research in general. The remainder of this study is organized as follows. I begin by summarizing theoretical arguments and modeling frameworks linking religion and well-being, with particular efforts in making cultural adjustments. Relevant hypotheses concerning the effects of religion on various health outcomes are then tested using 1998-2000 CHLS data. Finally, I review the findings and discuss their implications for future research on religion-health.

THEORETICAL BACKROUND

Religion and Spirituality in China

Is China, as a Chinese philosopher—Shi Hu pointed out, a nation without religion? The answer is an absolutely negative. Despite of several decades of political restrictions, China is a country with a long history of religious traditions and most people in this country practice a mixture of Buddhism, Taoism, Confucianism, ancestor worship, divination, Christianity, and others. This is reflected in the visible temples, shrines, altars and other places of worships, which are indicators of strong influence of religion in Chinese society. China is indeed a nation of religion, not in Western definition, but in its own way.

According to a recent Religious Life Survey in the contemporary China, approximately one third of the population (16 years and older) are involved in religious activities of one form or another and only less than 15% of the respondents identify

themselves as atheists (Sun 2007). That is, there are around 300 million or more Chinese are religiously active currently. Nowadays, religion increasingly becomes an essential part of Chinese spiritual life. For instance, when being asked the reasons of practicing religion, nearly 50% of the answers are spiritually related—"learning morals of humanity", "uplifting spirits", "pursuing peaceful minds", and "approaching the touching part of religious culture" etc. This is especially the case for the seniors, who are very likely to turn to religion for psychological comfort, social support, and spiritual fulfillment after withdrawing from various social roles and experiencing traumatic life events.

While the existence of multiple faiths may create difficulties in daily life, it is certainly not the case in China where different religious traditions co-exist peacefully and each of them serves different function in meeting the fundamental needs of Chinese people. For instance, Confucianism provides life philosophy and moral teachings; Taoism encourages harmony and balance; ancestor worship bridges communications between the dead and the living; and others such as divinations, regular fasting, and seasonal temple visiting bring fortune, luck, support, good health, and wealth. As a result, you will never be surprised when encountering a Christian having altars in his/her home. Chinese are unique in their practice of compatible and diverse religions, and practice them in a flexible and harmonious way.

Besides these general issues, there are three aspects of these faiths that are especially relevant to this study: While the first pertains to aging, the rest of them have to do with psychological resources and lifestyles, which are likely to bridge religion and health association in the Chinese context.

More specifically, while religious involvement is encouraged from birth in the West, religion in China tends to become increasingly important with age. In Christian

society, children are taught to attend Sunday school and church regularly. They have very close relationship with religious organization across life course. However, there are relatively fewer behavioral requirements of practicing Chinese religions. For instance, there is a famous Chinese saying— "Your heart is the one that works" (Xin Cheng Ze Ling)—describing that so long as Buddha or whatever God or Gods are in your mind, your prayer will be answered efficiently. That is, there is no need of strict or external practices; piety in the deep heart is the thing that really matters. But there are some exceptions—Chinese go to sacred places such as temples, graves, and shrines during sacred times such as New year's Day, Spring Festival, and Pure and Bright (Qing-Ming) to strengthen their piety. And those practices and rituals are usually led and especially cherished by its senior citizens who have experienced the death of loved ones, the loss of financial independence and social support, and health decline; who have survived ups and downs; and who are most knowledgeable on religious teachings. Therefore, if religion affects health in China, its impact should be the most salient in late life when religion becomes most meaningful. It is primarily due to this reason that the focus of this study is the elderly Chinese.

Second, Chinese religion shapes individual's world view and encourages harmony, thereby, is likely to promote psychological comfort, optimism, and even healthy lifestyles. Taoism and Confucianism are indigenous to China and are associated closely with Chinese ethnicity. For example, Taoism teachings such as "letting things be in their natural state", and Confucian ethics on "Ren" (deep empathy and compassion for others) and "Li" (a balanced harmonious way of carrying out inward power of concern for family, friends, and others) are all effective principles of maintaining harmonious interpersonal relationships. In contrast to the West where social ties are largely kept within religious organization and reinforced by weekly gatherings, social networks in

China tend to center around family and lay out to friends and others in daily life because almost every Chinese assume the same world view—venerating ancestors, practicing feng-shui, carrying out funerals, and enjoying the same annual festivals (Overmyer 1985). In this sense, even without official boundary, every Chinese is considered coreligionist of others. Older people who value more of these ethics and traditions tend to get along well with their family members and friends, which in turn, promote their sense of belonging and maintain their optimistic psychological status in late life. Meanwhile, on the basis of religious beliefs and practices, secular social ties are forged, from where various leisure activities such as exercise, play cards/chase/Mah-jong are likely to carry out among coreligionists. As a result, an engaged lifestyle is likely to go side by side with active religious practice among the elderly.

Third, Chinese religions emphasize the integration of spirituality and philosophy in ways that often highlight the mind-body connection. For instance, the traditional idea of "Ch'i" as it influences meditative/exercise practices such as Qigong, Tai-Ch'i, etc. is very different than the meanings of religion and spirituality in the U.S. or other Western societies. In this sense, Chinese religion also has the potential of developing healthy lifestyles of the elderly.

Religion and Well-Being in Congregational and Non-Congregational Settings

A convincing literature has emerged in the West (primarily on congregational religion), indicating that older adults who are more religious tend to enjoy better physical and mental health (Levin 1996; Koenig et al. 1997), subjective well-being (Musick 1996) and longer life (Strawbridge et al. 1997; Koenig et al. 1999; Hummer et al. 1999; Musick et al. 2004) than elderly people who are less involved in religion. The major mechanisms linking religion and health, according to a review article by Ellison and Levin (1998), include: regulation of individual lifestyle and health behaviors; provision of psychosocial

resources and coping strategies; and generation of other positive emotions. However, in China, these explanations are not likely to work the same way because formal religious organizations do not have the same significance for religiousness and spirituality.

More specifically, in the congregational setting, there are denomination-based restrictions on risk-taking behaviors, along with the universal moral and ethical teachings across a wide range of religious groups. Individuals, either internalizing these norms or under pressure, tend to act in an appropriate way, and gradually establish a general healthy lifestyle encouraged by the religious community where they belong to. Yet Chinese religion is non-congregational by nature. That is, there is no clear sense of membership in a congregation as an anchoring point for personal or family religiousness, and no regular collective worship or other ritual practices through which social ties can be developed and personal spirituality can be reinforced. Whether and how does this pathway take effect in China? Given the characteristics of Chinese religion mentioned above, I argue that elderly Chinese are still likely to be benefited along this line. Older Chinese who emphasize more on the ethics and the essences of Chinese religion tend to value more of family and interpersonal relationships, thus, are more likely to have harmonious families and more friends. This facilitates formation of informal groups, where collective leisure activities such as community based exercise, play cards/chess/ mah-jong, and others are carried out and health information is exchanged. This goes back to what Ellison and Levin remarked in 1998: “Religious persons may alter their lifestyles to make them consistent with those of reference group members—that is, persons they consider worthy of emulation.” Modeling after your healthy friends makes yourself healthy. Put together, this allows me to propose one way of linking religion and health among elderly Chinese—healthy lifestyles, indicated by the overall engagement index, exercise, smoke and drink habits.

The second pathway emphasized in the Western literature is social support, which is developed in religious settings and extends well into secular context. This is another reason why religion may exert beneficial effects on health (Ellison and Levin 1998). In general, there are two aspects of social support in religious context that are relevant to health. The first one is receiving-based support indicated by enacted support and perceived availability of support, with the latter one particularly beneficial for health and survival (Cohen and Wills 1985; Quick et al. 1996). Another aspect is providing support to others, which is found as the rhetoric and rationale in diverse religious faiths (Krause et al. 1999; Coward 1986; Ellison and Levine 1998) and tend to improve 'support-providers' own health via elevated sense of personal control (Krause 1986; Krause et al. 1992). Yet how much social support rationale is relevant in China among its very old citizens remains questionable. In a non-congregational setting as China, although there are informal groups providing support to its members, it is hard to tell whether this support is central to religious life or not. Even the providing aspect of social support, which is not congregationally dependent, is hardly applicable among the very old people whose ability of supporting others is limited and hard to be quantified. Therefore, this line of argument leads to a reasonable prediction: Social support, one of the key mediators linking religion and health in the congregational religion, may be relatively insignificant in China, where non-congregational religion is prevalent.

In addition to social resources, psychological resources such as self-esteem and sense of personal control enhanced by religious involvement are believed to be another connection linking religion and health. Several theoretical arguments in the West explain why this is the case: through devotional activities (e.g., prayer, offerings, worships, scripture reading) and other spiritual practices, individuals may construct personal relationships with the divine other/others in much the same way as they develop

relationships with secular others (Pollner 1989; Ellison 1994). Establishing intimate relationship with the omnipotent God or Gods implants power into the ordinary individuals, making them feel safe, strong, supported, capable, and optimistic. All these are positive psychological statuses that are good to health. To what extent, however, does this mechanism work in China? Given that this pathway has little to do with congregation, it is, therefore, expected to be applicable among Chinese who also stick to the devotional activities and spiritual practices but in their own way.

Meanwhile, religion itself is a coping strategy, providing "efforts, both action-oriented (e.g., prayer, worships) and intra psychic (e.g., meditation), to mange environmental and internal demands, and conflicts among them, which tax or exceed a person's resources" (Lazarus and Launier 1978). This, according to Ellison and Levin (1998), may alter primary appraisals, leading religious persons to reassess the meaning of the potential stressors as opportunities for spiritual growth or leaning, or as part of a broader divine plan, which in turn, undermines the detrimental effects of the encountered problems. This is exactly consistent with an old Chinese saying: The Tian—the God will not give you important task until you are suffered enough. That is, suffering is part of Tian's plan and it is prerequisite for success. Apparently, this way of thinking makes religious coping especially popular among socially marginalized groups such as women, the poor or the elderly. Besides, religion also encourages positive emotions such as forgiveness, contentment, and love, all of which are also essences and teachings in Chinese religions. Accordingly, I propose that religion promotes peaceful and contented mind, making it directly affect health and well-being of the elderly Chinese.

In a nutshell, as Musick et al. (2002) pointed out, "because the fundamental assumptions about the meaning of religious activity and its connection to perceptions about the aging process vary in different cultural settings and religious traditions, the

manner in which religion intersects with health among older people will vary." This leaves open a couple of crucial research questions pertaining to this study: To what extent, will religion-health connections be applicable in a new cultural setting as China where the distinguished characteristics of religion are identified? What modifications shall we make in constructing religion and health relationships in China?

Guided by the above inquires and theoretical arguments, I summarize the modified theoretical and modeling frameworks in Figure 2.1 and Figure 2.2, respectively, reflecting the adjusted application of religion-health associations in China. Figure 2.1 proposes how non-congregational religion works though the life stress paradigm (which is the basis of an interdisciplinary framework for investigating social patterns of various health problems) to affect health and well-being of elderly Chinese. Leaving out "social resources" component and keeping all the others, the dashed frame visualizes the potential linkages between religion and health in China. Figure 2.2 presents the modeling strategies with detailed measures inside each circle, pointing out the direct as well as the indirect pathways bridging Chinese religions and individual well-being. Collectively, I argue that non-congregational religions serve the similar functions in promoting well-being by shaping healthy lifestyles and bolstering psychological resources, although they may not have the same ability of providing social resources as congregational religions do (see the dashed frame in Figure 2.2). For example, there is another Chinese saying, "Being contented of what you are and where you are lead to a happy life" (Zhi Zu Chang Le). By integrating life philosophies and moral teachings, Chinese religion teaches people to live an optimistic and ascetic life, which may help the elderly overcome death anxiety and live a healthy and peaceful life. Likewise, religion also works efficiently in gathering the similar people together, helping them develop informal social groups and engage in various social activities that are good to health.

Religion and Cognitive Functioning

Although religion and health association is well documented, relatively fewer studies have explicitly looked at religion in its relation to cognitive functioning and dementia, which are very important health problems for the elderly population.

Available studies are found in the contemporary U.S. Drawing from the racially and religiously diverse sample of 2,812 old community-dwelling men and women from New Haven, Connecticut, Van Ness and Kasl (2003) reveal the inverse association between religious attendance in 1982 and cognitive dysfunction in 1985, and indicate that religious attendance is a religious form of social engagement that makes a contribution unique in maintaining cognitive functioning, over and above other aspects of social engagement. In addition, applying the four-wave data collected from a sample of 3,050 older Mexican-origin individuals, Hill and colleagues (2006) constructed a series of linear growth curve models to assess the effects of religious attendance on cognitive functioning trajectories. They found religious attendance is associated with slower rates of cognitive decline among older Mexican Americans over time.

Several lines of theories are put forth regarding on religion and cognitive functioning association. The most famous one is called social engagement theory advocated by Bassuk, Glass, and Berkman (1999). In their study of 2812 non-institutionalized elderly (65 years of age or older), they document that in comparison with people who have five or six social ties, those who have no social ties are at increased risk for incident of cognitive decline after adjusting for the possible confounders. So they conclude that social disengagement, a global scale constructed by six social connections including religious attendance, is a risk factor for cognitive impairment among elderly

persons. Social connections and activities are believed to inhibit the deterioration of cognitive functioning by providing mentally stimulating social environment.

The second strand of theory focuses on the relationship between general lifestyle and successful cognitive aging. It is proposed that active lifestyle can promote cognitive functioning by improving cerebral blood flow (Hall, Smith, and Keele, 2001). A population-based longitudinal study conducted by Newson and Kemps (2005) argues that after controlling for sensory functioning, activity is a significant predictor of current levels of speed, picturing naming, incidental recall, and verbal fluency, and other dimensions of cognitive ability. Scarmeas and Stern (2003) provide epidemiological evidence supporting that lifestyle characterized by engagement in leisure activities of intellectual and social nature is associated with slower cognitive decline in healthy elderly and may reduce the incidence of dementia.

In addition to social activities, smoking and alcohol consumption are also important component of lifestyle. Religion discourages substance abuse. Although previous studies remain controversial, some evidence suggests negative association between smoking or alcohol abuse and cognitive functioning among older adults. In their 13-year prospective study, Edelstein and colleagues (1998) indicate that among women, increasing consumption of alcohol predicts a significant decline in long-term recall, and smoking is associated with categorically defined poor cognitive abilities on two out of five tests. Similarly, Elwood and collaborators (1999) also find that current smokers generally give lower test scores in cognitive abilities than ex-smokers or never-smokers.

A few clinical studies focus on optimism and personal control as the predictors of cognitive functioning. For example, one clinical study conducted by Allison and colleagues (2000) among head and neck cancer patients suggest that in comparison with pessimists, optimistic patients report better role, cognitive and emotional function. Given

that (1) depression and cognitive functioning is negatively related; and (2) religion promotes psychological well-being by boosting self-esteem and optimism, it can be expected that religious practice may have indirect effect on cognitive functioning by motivating the necessary psychological resources. But how well will the above Western theories and empirical findings on religion and cognitive functioning fit into Chinese context? Can we consider religious practice in China as a socially engaged activity and lifestyle? Given that religious activity in China has its social component and positively shape the other healthy lifestyles, my answer to these questions is affirmative.

Although Chinese do not have regular institutional attendance, they have routine activities, such as holiday worships and ancestor memorizing, which are related directly to religion. In this sense, religious practice in China is far more unitary; rather, it has diverse forms and every single form has its social component, which can be positively related to cognitive maintenance. For instance, in the name of ancestor worship, family members get chance to gather together under the leadership of seniors. By doing so, family boundary and identity are repeatedly enhanced. In addition, holiday worshiping initiates and encourages further interactions among co-religionists, thus, informal social groups and networks get developed and enlarged in the secular settings.

Religious people, coming from the different socioeconomic backgrounds, pray for different reasons in front of different deities. However, they share the same piety and underlying regularity. Thus, temple or some other sacred places like ancestor graves become one of the few places where socioeconomic boundaries get crossed. Meanwhile, by prayers and meditations, the relationships and communications between secular persons and divine deities are well established (Pollner 1989), which serve similar functions in promoting cognitive sophistication as the secular networks do.

Taken together, I propose that Chinese religion has both direct and indirect effects on cognitive maintenance and its indirect effect primarily goes through engaged activities, lifestyles, and psychological resources.

SUMMARY OF HYPOTHESES

Based on the theoretical ideas and empirical findings described above, I propose the following hypotheses.

Hypothesis 2.1: Controlling for the possible sociodemographic covariates and activities of daily living (ADLs), religious participation is associated positively with mental health indicated by (a) low levels of distress and (b) high level of cognitive functioning.

Hypothesis 2.2: Controlling for sociodemographic covariates, religious participation is associated positively with physical health indicated by (a) self-reported health and (b) ADLs.

Hypothesis 2.3: Religious participation predicts survival over time.

Hypothesis 2.4: Religion has both direct and indirect effects on health and well-being. Its indirect effect goes primarily though psychological resources such as optimism and self-autonomy (indicted by self decision making), and healthy lifestyles such as engagement, exercise, smoking and drinking behaviors.

Hypothesis 2.5: Social support, one of the key mediators linking religion and health in Western congregational religion, is no longer significant in China, where non-congregational religion is practiced.

DATA

Data to test these ideas come from the 1998 Chinese Healthy Longevity Survey and the 2000 follow-up. The baseline survey contains 9,093 respondents aged 77 - 122. In

2000, 4,831 respondents remained and were re-interviewed, while 3,368 respondents were deceased and 894 were lost to follow-up. This data set is ideal for testing the proposed hypotheses because of its richness in variables tapping characteristics of psychosocial resources, and health lifestyles. Likewise, a wide range of health measurements are covered in this data set, which facilitates the comprehensive examination of religion-health relationship. Moreover, the wide coverage of the geographic provinces and municipalities (22 out of 31) in the survey adds an additional variability into the data set. Respondents were from 631 randomly selected counties and cities of the 22 provinces where Han Chinese are the majority and the total population of which is 980 million, 85.3 percent of the total population of China. The response rate is 88%. Assessment of the data reliability have been conducted and been found to be of high quality. Please refer to Yi et al. (2001) and Yi and Vaupel (2002) for details about the data, its quality, calculation of sampling weights, and initial analyses.

MEASURES

Dependent Variables

Distress. Psychological distress is measured by a 4-item index. Respondents were asked: "how often do you feel 1) fearful or anxious; 2) lonely and isolated; 3) useless; and 4) as happy as younger? "Responses to the first 3 distress items were coded never (1), seldom (2), sometimes (3), often (4) or always (5), and responses to feeling happy were coded in reverse. The index is the mean response to the 4 items, scored 1 - 4. All items load on a single factor above .4; the alpha reliability is .55; and mean is 2.64, with a standard deviation of .63 in 1998.

Cognitive Functioning. It is measured by a 24-item index from the Mini-Mental State Examination—MMSE (Folstein, Folstain, and McHugh 1975). The MMSE has

been used extensively to measure the cognitive dysfunction of older adults across cultures, including Chinese; and it has been found to be a valid measure of cognition among Chinese population. However, the Chinese version of MMSE adopts some appropriate adjustments to make the questions more understandable and answerable among ordinary Chinese oldest old, the majority of whom are illiterate (Yi and Vaupel, 2002). For instance, the Chinese MMSE asks respondents to name as many foods as possible (in one minute) instead of writing a sentence, which is a quite difficult task for the elderly. Overall, respondents were asked by 5 orientation related questions (naming the current time, animal year, season, festival, and county), one naming foods question, 6 word recall questions (3 words are mentioned and respondents are asked to repeat them two times), 5 calculations questions (respondents are asked to subtract 3 from 20, then 3 from the previous resulting, and so on), 3 language questions (repeating a sentence and naming simple items such as pen and watch that are shown to the respondents), 1 drawing question, and 3 comprehension questions (respondents are asked to take paper in their right hand, fold it, and then put it on the floor). Responses to the questions were coded wrong (0), correct (1). Recommended in the literature, "Not able to answer" item was coded "0" (Zhang 2006). Then a continuous measure is calculated by scoring one point for each correct answer. Therefore, cognitive functioning is a sum response to the 24 times, scored 0-30. All items load on a single factor above .5; the alpha reliability is .95; and mean is 21.11, with a standard deviation of 8.98 in 1998.

Self-reported Bad Health. Respondents were asked to evaluate their overall health status. Reponses to the question were coded into five categories with high score reflects bad health (1=very good, 5=very bad). The sample mean and standard deviation in 1998 are 2.40 and 0.84, respectively.

Activities of Daily Living. The ADL is assessed by a sum index of activity of daily living, which measures elders' level of independence in daily living composed by the ability of eating, dressing, transferring, using toilet, bathing, and continence. Responses were coded: "without assistance" (0), "with assistance" (1). I summed responses to create an index (α =.87) with high score reflecting more disabilities in daily living. In 1998, the sample mean and standard deviation are 1.01 and 1.76, respectively.

Death. A dummy variable is created to identify the oldest old who were dead (sometime between 1998 and 2000) contrast to those are still alive in 2000 interview. Thirty seven percent of the sample died.

Independent Variables

Religious Participation. A simple and straightforward question on religious activities was asked: "at the present time, do you participate in any religious activities?" The response options are: almost everyday, sometimes, and do not participate at all. Responses were coded in an increase manner with high score reflecting more religious participation. In 1998, over sixteen percent of the respondents reported to participate religious activities almost everyday or sometimes.

Social Resources. Three indicators are used to tap the characteristics of respondents' social connections. Marital status compares the currently married (coded 1) with non-married (coded 0). Living arrangement contrasts persons living with their family (coded 1) to those living alone and in nursing home (coded 0). Persons cared by family members when sick (coded 1) contrasts to those cared by others (coded 0). At baseline, 16.4% of the sample is married, 84.9% lives with their family, and 91.8% receives family care when sick.

Psychological Resources. Optimism item ask respondents about: "how often do you look at the bright site of the things?" Responses to this item were coded never (1),

seldom (2), sometimes (3), often (4) or always (5). The mean and standard deviation of optimism in 1998 are 3.92 and 0.81, respectively. Self-autonomy is measured by question: “how often do you make your own decision?” Responses were coded in an increase (1-5) manner such that the high score is more self-directed. In 1998, the sample mean and standard deviation of decision making is 3.53 and 1.03.

Health Lifestyles. Engagement in the daily activities is created by the following four items: gardening, reading, watching t.v. or listening to the radio, and playing cards or mah-jong. Responses were coded never (1), sometimes (2), almost everyday (3). I averaged responses to create an index (α =.61 in 1998; α =.60 in 2000) with mean 1.33 and standard deviation .41 in 1998. Exercise, the second indicator of health lifestyles, is measured in response to the question: “do you exercise at present?” It is scored no (0) vs. yes (1). (27% of the sample reports exercising in 1998). Similarly, smoking is measured in response to the question: “do you smoke at present?” It is recoded no (0) vs. yes (1) and around 17% of the sample is current smokers in 1998. Heavy drinking is determined by the following three questions: “do you drink alcohol at the present time? If drink, how much per day on average do you drink? And what kind of alcohol do you mainly drink?” The measurement unit employed to gauge the amount of drinking is “liang”, which is around 50 grams and it is widely used as a unit to measure alcohol consumption in China. The response categories for the types of drink are liquor, wine, and rice wine. Heavy drinkers (coded as 1) are identified from drinking more than two liang (100 gram) of liquor, or six liang (300 gram) of wine, or 8 liang (400) of rice wine per day; otherwise, the subjects is coded as 0.

Other control measures. Age is in years (average age = 92). Gender is coded 0 = male and 1 = female. Ethnicity is coded 0 for minorities, and 1 for Han majority. I also use a dummy variable to compare urban (coded 1) with rural residents (coded 0). In the

baseline sample, 60% is female, 92.8% is Han, and 38.2% is urban residents. Education is measured by years of former schooling completed. The average schooling of this sample is around two years with approximately 4 years of standard deviation. Current economic independence is measured by asking respondents, “What is your main source of financial support?” Economic independence is scored one if the respondent answered either their own work or retirement wage. Around eighteen percent of the sample is economically independent.

RESULTS

The findings from this study are organized in two sections. Examination of the overall profile of religious participation is presented first. Following this, the substantive results regarding on the relationships between religious participation and various health outcomes are discussed.

Bivariate Results

Table 2.1 displays descriptive statistics and the significant tests of religious participation across covariates. In general, levels of religious participation differ significantly by sociodemographics, lifestyles, psychosocial resources, and health status. More specifically, in comparison with octogenarians (1.23), nonagenarians and centenarians exhibit significant lower levels of religious participation (1.20 and 1.23) on average. Compared to females, males show much lower mean levels of religious participation (1.25 vs. 1.14). And urban residents (1.24) and Han majorities (1.21) display much higher levels of participation than rural residents (1.18) and other minorities (1.08). Similarly, religious participants are also more likely to be individuals with higher engagement in various activities (1.25 vs. 1.19), individuals exercising more (1.26 vs. 1.18), non-smokers (1.21 vs. 1.16), the unmarried (1.21 vs. 1.16), individuals who are

more optimistic (1.22 vs. 1.19) and self autonomous (1.23 vs. 1.19). Compared to individuals living with their family, individuals live alone or in nursing home (1.27, 1.25 vs. 1.19) are more religiously involved. Finally, respondents who report bad health are less likely to be involved in religious activities than their healthy counterparts. Nevertheless, no clear educational difference in religious participation is found.

Multivariate Results

Bivariate results provide a general picture of the average level of religious participation across covariates of interest, on the basis of which detailed multivariate analyses are conducted to gauge religion-health association, the focal relationship of this chapter. I examine five aspects of health status: distress, cognitive functioning, self-evaluated health, ADLs, and death (See Table 2.2 to Table 2.5). I use four basic models for each dependent variable: in model 1, I present the total association between religion and each measure of health status, adjusting for possible sociodemographics. In model 2, I add social resource variables—marital status, living arrangement, and care when sick. Psychological resources—optimisms and self-autonomy are added in model 3. Healthy lifestyles including engagement index, exercise, smoke, and drink habits are added in model 4. With these sequential models, net effects of religion as well as the mediating effects of the proposed covariates will be identified.

. Table 2.2 and 2.3 present the estimated net effects of religious participation and covariates on mental health indicators—distress and cognitive functioning. Given that religious participation may partially depend on functional limitations (Ainlay et al. 1992; Bertera and Bailey-Etta 2001; Hill et al. 2006), in model 1, I control for ADLs, in addition to the sociodemographics. Results show that religious participation is significantly associated with less distress ($b=-.029$, $p<.05$) and better cognitive ability ($b=.765$, $p<.001$), in particular. In table 2.2, while social resources do not reduce any

effects of religion on distress (see model 2), psychological resources and lifestyles reduce approximately 59% the effect of religion (see model 3-4). As a result, the coefficient of religion is no long significant in model 4 (b=-.012, p>.10). When cognitive functioning is applied, similar patterns are found with one exception (see Table 2.3): After psychological resources and lifestyles explain 6% and 13% of religion's effects, the coefficient of religion is still very significant in model 4 (b=.631, p<.001). To some extent, this indicates strong and direct effects of religious participation on cognitive functioning, a lot of which can not be accounted for by the proposed mediators. Collectively, the full model—model 4 of Table 2.3 account for almost 37% of the variation in cognitive functioning. Thus, hypothesis 2.1 is supported by the data.

Table 2.4 compares models of two physical health indicators—self-evaluated health and ADLs. Consistent with findings in Table 2.2 and 2.3, religious participation is associated strongly and negatively with both self-reported poor health (b=-.064, p<.001) and ADLs (b=-.257, p<.001). And the combination of psychological resources and healthy lifestyles reduce quite a bit of the effects of religion (58% for self-reported poor health and 21% for ADLs). However, the coefficient of religion is still significant in model 4 of the right-hand side of the table (b=-.199, p<.001). Once again, strong and direct effects of religion on ADLs are identified, thus, hypothesis 2.2 is supported.

Although the estimated net effects of covariates are not the primary focus of this study, some interesting patterns merit brief mentioning. First, the association between education and health is quite interesting: while it is strongly associated with mental health, it is not related to better physical health. Second, no matter what health indicator is used, females report consistently worse health than males. Third, the patterns of ethnicity and residence in relation to physical health are a little contradictory across Table 2.4: while Han and urban residents report better self-reported health than minorities and

rural residents, they are worse off in terms of ADLs, a more objective measure of physical health. Although this inconsistency is likely due to sampling errors, it indicates a potential possibility: Han and urban residents tend to overestimate their health status even if they are indeed handicapped by some daily disabilities.

Table 2.5 reports findings from logistic regressions focusing on mortality as the outcome. The consistently significant odds ratios in the first row (odds ratio [OR] = .85, $p<.01$ in model 1 to OR=.90, $p<.1$ in model 4) indicate the beneficial effects of religion on longevity, with only a small amount of which is mediated by health lifestyles. Thereby, participating in religious activities predicts longer life, that is, lower risk of dying. Although mediating little effects of religion on death, some proposed covariates are seen to be strongly associated with longer life too. For instance, results suggest that individuals having living spouse (OR=.67, $p<.001$), engaging in various activities (OR=.58, $p<.001$), and exercising more (OR=.65, $p<.001$) are better off and have lower odds of dying. Thereby, hypothesis 2.3 is supported.

In sum, with some deviations, findings in this chapter generally support my hypotheses. Religious participation is found to have both direct and indirect effects on mental health, physical health, and survival, and much of its indirect effects are mediated by psychological resources and especially indicators of healthy lifestyles, but not at all by social resources. Therefore, congregational and non-congregational differentials in the effects of education on health are likewise supported by the data.

DISCUSSION

Studies on religion and health have dramatically increased in the past decades. Although findings remain inconsistent in some ways, the beneficial effects of religion, service attendance in particular, on well-being, especially mortality are wide spread. However, the majority of the empirical work in this area has conducted in the Western

Judeo-Christian societies. Far fewer studies have ever examined similar relationships in China, the biggest Asian country in the world, where religion is practiced and understood differently. Thereby, this study contributes to the literature on religion and health in at least four ways: (1) by confirming the salutary effects of education on well-being in China among its oldest citizens; (2) by using data from a longitudinal survey; (3) by examining religion's effects on five distinct indicators of well-being; and (4) by disclosing the distinguished mechanisms linking religion and health in the non-congregational settings.

First, my findings add to the existing body of knowledge concerning religion and its linkages with well-being by confirming the salutary effects of religious participation in China among its oldest population. Religious practice in China is complicated, with characteristics distinguishing it from Western congregational religions. Chinese practice multifaceted, private, and non-congregational religion. Applying for Western criteria or being asked the general questions, religious practice is likely to be underestimated in China. Even under this situation, however, religious beneficial effects on various health outcomes are still identified in this chapter. Therefore, these findings extend the salutary effects of religion to the non-congregational settings where service attendance is no longer a dominant measurement of religiosity. Without official boundary, establishing relationships with divine others and secular co-religionists, carrying out regular religious rituals, or practicing religious teachings still matters for health and well-being. Religion is much more than service attendance.

Second, although religion benefits health in China, the ways through which it takes effect are different. Psychological resources and healthy lifestyles, in particular, mediate much of the religion-health association. Participating in religious activities is highly correlated with individual's overall engagement that is good for health.

Nevertheless, social support, another key mediator in the Western congregational religions does not seem to work in this study. One possible explanation for this relies on the difficulty in differentiating and quantifying religion-based social support in the non-congregational settings. Without official boundary, it is relatively difficult to tell what kinds of support are (1) central to religion; (2) found in diverse religious settings; and (3) related empirically with health, all of which, according to Krause and colleagues (1999), are the caveats in selecting dimensions of social support suitable for the study of religion and health.

Third, use of longitudinal data allows us to examine the effects of religion on survival. The significant and negative association between religion and the odds of death support my expectation. This adds a much-needed dynamic element to our knowledge, with which we come closer to capturing social reality. Meanwhile, this chapter covers a wide range of health and well-being indicators, including mental health (e.g, distress and cognitive functioning), physical health (e.g., self-rated health and ADLs), and survival, all of which are associated with active religious participation. In one way or another, this comprehensive picture of religion-health association reduce the likelihood of spurious relationships to some extent. Engaging in religion appears to promote or maintain health of elderly Chinese.

Although this study provides answers to several significant questions, future research is in great need along several lines. The first priority is measurement improvement. Both measures of religion and social support warrant further scrutiny. Rather than asking the general questions on religious participation, more comprehensive, detailed, and well developed set of survey questions tapping multifaceted aspects of religiosity need do be developed in future surveys. For instance, instead of asking question like “Are you religious”, we probably should approach by detailed questions

like: “what kind of God or superpower do you believe in” or “Do you go to temper or other divine places regularly” and “for what reason/reasons?” In addition, measures of social support deriving directly from religious channels should be identified and designed such that the effects of religion-based social support on health can be tested in comparison with other types of social support from non-religious settings.

Measurement improvement in the survey needs qualitative interviews working as the antecedent. Focus group and in-depth interview are the ideal methods in piloting large scale survey questions. Talking to individuals personally will help us get clearer ideas of their spiritual life. Although the neat results got in this chapter provide an optimistic start for future religion-health research in China, we still know very little about (a) what types of religion elderly Chinese are actually practicing; (b) how they practice; (c) whether there are intergenerational conflicts in religious practice and beliefs; and (d) whether and why there are gender differences in religious practice and benefits. One the basis of a more comprehensive understanding of these issues, we will then be able to (a) study multifaceted aspects of religiosity and their different associations with health, and (b) differentiate religious participation with other kind of activities and compare their different effects on health.

Third, more waves of data covering longer period of time will be even better in examining the effect of religion on change of health status. Besides longer period of time, we also need larger sample with younger generations included. A recent survey in China on religious life (Sun 2007) indicates a surprising trend in the contemporary China: younger religionists are increasing dramatically. Although it is not clear whether they are more likely to identify themselves as religious than their older counterparts, it is good to include them in the future survey in order to examine age differences in religious

participation and perception of meaning of religion. Does religion and health association hold for persons who practice religion more or only hold for those who value it more?

Although there is much additional work to be done, I believe that this study has made a significant contribution to the literature on religion and health. To the best of my knowledge, this is the first examination of the effects of religious practice on health in China among its oldest population. Results suggest that this may be an important and promising topic for religion-health researchers after overcoming measurement drawbacks, including more age groups, and integrating detailed religious elements.

Chapter 3: Religious Participation and Well-being: Variations across Gender and Two- Level-Socioeconomic Status

ABSTRACT

In this chapter, the interplay among religion, socioeconomic status (gauged at both individual and community levels), and health are presented. A few studies in the Western societies suggest that socioeconomically marginalized groups tend to be engaged more in religion and gain more from it than their well-to-do counterparts. Religion opens an alternative channel and provides necessary resources for those socially deprived individuals. But will this deprivation-compensation view hold true in China among its very old? This chapter examines gender, individual- and community-level SES differences in religious participation, and in their associations with emotional and cognitive well-being. It reveals that: (1) Two levels of SES differ in their relation to religious activity: while individual-level-SES is associated negatively with religious participation, community-level-SES is associated positively with religious participation; (2) Females are more religiously involved than males on average and gender gap in religion increases with levels of education; (3) Religious participation has stronger negative association with distress among residents of poorer areas; and (4) Religion, gender, and both individual- and community-level indicators of SES are all strong predictors of distress and cognitive functioning over time. These findings continue the elaboration on social stratification differences in religion and their different associations with mental health over time within an Asian context.

INTRODUCTION

Over the past decades, a growing literature has examined individual religious involvement and health. Although this work remains controversial in some quarters, there is mounting evidence, suggesting that some aspects of religiosity and spirituality have salutary effects on health and well-being (Koenig, McCullough, and Larson 2001; Smith, McCullough, and Poll 2003; Hummer et al. 2004). Many—perhaps most—studies in this area have gauged religious involvement in terms of affiliation or self-reported religious behavior, such as the frequency of attendance at services, or the frequency of prayer or other devotional activities. Recognizing the limitations of these measures, in recent years, investigators have increasingly turned to more sophisticated conceptualization and measurement approaches, focusing on not only the content-based measures (e.g., personal spiritual experiences, spiritual well-being) but also the functional measures (e.g., meaning, coping, support) in order to comprehensively capture the role of religiousness and spirituality in individual lives (Ellison and Levin 1998; Krause 2002; Idler et al. 2003). These endeavors of covering the multiple aspects of religiosity make the examination of religion-health association in a non-congregational setting like China become feasible.

Along with the endeavor of seeking the multidimensional aspects of religious beliefs and practices, a small but growing body of Western work starts to focus on the interplay among religion, SES, and mental health. This line of evidence reveals that the effects of religion on mental health tend to be contingent on elements of SES (Schieman et al. 2003; Schieman et al. 2006). While some studies support "resource amplification" view by declaring that people with more socioeconomic resources enjoy better psychological benefits of religiosity, others suggest the opposite—"resource

compensation" hypothesis—religion works as the counterbalancing force against lower socioeconomic standing. Which scenario works in China among its elderly citizens?

To the best of my knowledge, no studies in China have ever explored whether core components of SES such as education and community residence combine with religiosity to affect mental health status. Therefore, by focusing on China and its oldest old citizens, and applying a simple but generalized measure of religiosity—religious participation, this chapter aims to (1) examine social stratification differences in levels of religious participation; (2) explore cross-sectional and longitudinal effects of religious participation on emotional and cognitive well-being, and (3) the possibility that such associations vary by gender and levels of SES; and (4) access those relationships net of individual level psychosocial resources and life stressors. This chapter attempts to contribute to the theoretical views by continuing the ongoing Western explorations of the interplay among religion, gender, two-level-SES, and mental health outcomes within an Asian context among its very old population. Specifically speaking, I would like to pursue how the influence of religious participation on mental health depends on levels of SES, when controlling for the possible sociodemographic confounders (See Figure 3.1. for the Conceptual Model).

The remainder of this study is organized as follows: I begin by summarizing theoretical arguments where the conceptualization of religion, gender, and two-level-SES, and their potential importance for emotional and cognitive well-being and for older adults are discussed. Relevant hypotheses concerning main and contingent effects are then tested using both cross-sectional and longitudinal data from 1998-2002 Chinese Healthy Longevity Survey (CHLS). Finally, I review findings and discuss their implications for future research on religion, SES, gender, and mental health, as well as the religion-health connection more generally.

THEORETICAL BACKGROUND

Religious Participation in China

In contrast to the congregation-based religions in the Western societies, religious practice in China has its own characteristics and relatively hard to be quantified using Western criteria. Difficulties primarily come from the following aspects: First of all, Chinese religion is largely non-institutional and non-doctrinal, which makes service attendance and doctrine reading hard to be applied. Second, the mixed worship of multiple deities and ancestors, various forms of rituals and divinations (Fan 2003) adds an additional toll on the quantification and examination of Chinese religion. Third, Chinese religion has its philosophical component, with teachings of Confucianism and Taoism saturating into every aspect of Chinese life. This aspect of religious belief is hard to be separated from daily life. Finally and the most importantly, due to historical and political reasons, Chinese have the tendency of resisting definition and being labeled. As a result, even if they adore Confucianism and Taoism, go to temples/churches and practice rituals regularly, or have shrines in their homes, they may not identify themselves as truly religious. They regard these activities as daily, monthly, or yearly routines. Thereby, instead of grouping themselves within a particular religious group publicly, Chinese practice privatized religion. By doing so, they protect themselves from standing out for whatever target, and at the same time guarantee that their piety is recognized and their prayer are taken care of by their deities, their ancestors, or whatever super power in their mind. Due to the above reasons, scholars from both China and West start to use the term –"popular religion" or "diffused religion", as opposed to "institutional religion" to describe the unique characteristic of religious practice in China (Yang 1961; Fan 2003; Overmyer 2002; Dean 2003).

Taken together, most religions in China are non-congregational by nature and have the tendency of perpetuating into different aspects of Chinese culture, traditions, values, and history, shaping them and being shaped by them. It is relatively hard, therefore, to be either examined or measured by using Western criteria. As a result, instead of asking Chinese the detailed questions like service attendance, frequency of prayer, or doctrine reading, a simple probe of "how often do you participate in any kind of religious activities" might be the best way to approach and capture the unique characteristics of religious practice in China. Therefore, in this chapter, I apply the frequency of religious participation as key measure of religiosity of elderly Chinese.

Potential Benefits of Religious Participation

Western studies document that organizational religious participation as well as private religiosity has salutary effects on individual mental health. According to Ellison (1991), and Ellison and Levin (1998), there are at least four ways through which religion may benefit various aspects of well-being and they are: social integration and support, establishment of relationships with a divine other or others (Pollner 1989), provisions of meanings and existential certainty, and promotion of healthy behaviors and lifestyles. Although Chinese religion is primarily non-institutional, it can be reasonably argued that except for the relatively weak influence of social support, all the other explanatory mechanisms still applicable.

Even the non-institutional religion has social component, which may be related to health. For example, although highly organized network with regular religious activities hardly exist in Chinese society (Weller and Shahar 1996; Thompson 1989), religion bonded relationships still exist. This is especially true for the south-east villages in China where the networks of temples provide a wide range of services, raise funds, and mobilize entire communities to join in collective rituals (Dean 2003). Even in other parts

of China, individuals sharing similar piety tend to practice rituals together and form informal groups for occasional gatherings and information exchange.

In sum, although the literature bridging religion and mental health is relatively scarce in China, the characteristics of Chinese religion and its functions on well-being can be easily captured by direct observations and analogical reasoning. Therefore, Western theories and interpretations on religion and health are assumed to be applicable in Chinese societies with appropriate cultural and operational alterations (See Chapter II for detailed arguments).

Importance in Late Life

Religion is good for health, but its effects vary across subgroups. For example, U.S. findings suggest that religion is particularly important in late life. There are several reasons explaining why this is the case. First, religion may help older adults efficiently cope with life stressors such as bereavement, deteriorating health, declining sense of personal control (Mirowsky and Ross 2003) and increasing death anxiety (Kalish 1976), which are not amenable to change with advancing age. Second, religious practice and belief may also make up the losses of psychosocial resources, which diminish with age as well. For the current elderly Chinese who have survived World War I and II, War of Resistance against Japan (1937-1945), Chinese Civil War (1945-1949), Cultural Revolution (1966-1976), and various natural disasters, the presence of effective coping strategies and alternative resources becomes especially important. Third, late life is also time of reflection when the elderly need a spiritual lift to help them reevaluate their past, make sense of their sufferings, weave their lives into a coherent whole, and achieve life transcendence (Erikson 1959; Buhler and Lewis 1982, Krause 2003). In summary, withdrawing from various secular roles increases the significance of religion and divine relationship in late life.

Although religion is not the only way of coping with life difficulties, Western findings and some studies in Japan (Krause et al. 1999) provide eloquent evidences suggesting that older adults relying more on religion for meanings and support enjoy better subjective well-being than their less religious counterparts. Put together, if religion affects health in China, its impact is expected to be more evident in late life when religion becomes the most meaningful and significant. It is primarily due to this reason that the focus of this chapter is the elderly Chinese.

Dimensions of Stratification and Religious Participation

Gender and Religious Participation

In China, levels of religious participation and their association with emotional or cognitive well-being are expected to depend on two core dimensions of social stratification: gender and SES. While most studies in Western countries focus on race as key measure of social stratification, it is more appropriate to use gender in China where race and ethnicity differential is neglectable in comparison with huge gender differences. Although women started to "Hold Up Half the Sky"[4] and their socioeconomic conditions improve tremendously after the establishment of PRC, in general, women still play subordinate roles due to the profound influences of (1) Confucianism, which place women at the lower end of the patriarchal family structure; and (2) New Confucianism, which stratify the position of women even more and lead to the practices of foot bindings, insistence on widow chastity, and the selling of unwanted daughters etc. Nowadays, over 80 percent of Chinese women work outside their home and some of them even participate in political activities, but the habits and traditions established thousands of years ago and carried over generations do not change easily. Women and men in China still differ

[4] Mao Zedong fist came up the phrase "Women Hold up Half the Sky" and mobilized women to get out of home and enter work force.

significantly in behavior expectations, position at home, legal rights, work types, public status, and education. For those elderly Chinese who were born at the turn of 20th century and got some Chinese traditional education, the sharp gender differential and its tremendous influence in women's daily life may be even more evident.

Therefore, despite the huge improvements, Chinese women still belong to the socially deprived group in China and this is particularly the case for the current oldest old women. Because of their lower social status, many studies in the West provide empirical evidence suggesting that women are not only more involved in religion (Strawbridge et al. 1997; Koenig et al. 1999; Krause et al. 1999; Krause 2006), but also benefited more from it than their male counterparts (Strawbridge et al. 1997; Koenig et al. 1999; McCullough et al. 2000). Accordingly, I propose that due to occupying the similar disadvantaged social positions, Chinese women are likewise more likely to involve in religious activity and gain more from it than their male counterparts.

SES and Religious Participation

In addition to gender differentials, there are huge individual- and community-level SES differences in China. Western findings on the interplay among religion, levels of stratification, and health status primarily suggest two lines of evidence—differential involvement and differential impact. First, religious participation and practice differ across socioeconomic groups. In the U.S, while some studies indicated that African Americans, women, and older people are more religiously involved than their Whites, men and younger counterparts, others documented that various dimensions of SES are positively associated with church attendance (Stark and Finke 2000) and religious consolation (Ferraro and Kelley-Moore 2000). Outside the U.S., however, SES differentials in religious involvement exhibit different features. In response to the question "How important is religion in your life?", Inglehart and colleagues found in their

1999-2002 World Value Surveys that the more educated and the higher income groups tend to place less emphasis on religion than the less educated and lower income groups although this pattern mainly applies to advanced industry societies (Inglehart et al. 2004). Some Asian countries such as South Korea and Japan are included in this group. Unfortunately, Very few Chinese answered this question, thus, we can hardly find any pattern there. However, given that Asian countries such as Japan, Korea and China share a lot of similarities in religious practice, culture, and traditions, it can be reasonably expected that in comparison with their less educated counterparts, more educated Chinese would be less religious.

Second, differential impact view suggests that religion's effects on health depend on socioeconomic status. Socioeconomically marginalized or disadvantaged people such as African Americans, the less educated, women, and the elderly tend to derive greater psychosocial benefits from religion than their corresponding counterparts. Pollner (1989) revealed that the impact of divine relations on well-being is stronger among the less educated people. Study by Ellison (1991) also suggested that the effects of divine relationships and "existential certainty" on psychological well-being are stronger among less educated ones. Likewise, Schieman and colleagues (2006) found that the levels of the sense of divine control are highest among African-Americans and lower SES individuals. Several studies by Krause provided further evidence—education is negatively related with religious coping (Krause 1995), feelings of connectedness with God (Krause 2002), religious meaning (Krause 2003), and God-mediated control (Krause 2005), all of which are factors strongly associated with psychological well-being.

Although empirical studies are relatively fewer, theories explain how and why socioeconomic stratification might influences levels of religiosity and its effect on health are not new and can be traced back to Karl Marx, who claimed that "religion is nothing

but the fantastic reflection in men's minds of those external forces which control their daily lives" (Marx and Engels [1878] 1964). Later there comes the concept of "deprivation-compensation" proposed by Glock (1964) who maintained that socially disadvantaged people tend to develop deep intrinsic religiosity and a relationship with God to compensate for their miserable life and thus acquire comfort.

Compared to the more educated and people with higher income, less educated and individuals with lower income have fewer psychosocial resources. And the presence of the extra stressors and the absence of the necessary resources to cope with these stressors make religious practice and community become essentially important. For instance, lack of secular social relationships can be compensated for by the establishment of divine relationship, which benefits well-being, especially for those less educated ones (Pollner, 1989). Likewise, Ellison (1991) pointed out that the reason why "the effects of divine relations and existential certainty on well-being may be strongest among persons with lower levels of formal education" is that "the strong religious faith and/or practice may compensate for the lack of more sophisticated cognitive resources". People who are suffering and disadvantaged in many aspects have to find ways to make sense of their situations and religion offers them such "existential certainty" and thereby, helps them construct a sense of meaning and coherence in their lives.

Along these theoretical arguments, several studies by Krause used "differential involvement" and "differential impact" constructs to summarize the racial differences in religiosity. According to him, older African Americans are more deeply involved in religion and derive more from it than older Whites. In a similar vein, Ross and Mirowsky (2006) argue that sex conditioned the association between education and psychological well-being and the gender gap in depression essentially disappeared among persons with a college degree or higher. Women benefit more from education than their male

counterpart because “resource substitute for each other, the presence of one makes the absence of another less harmful” (Ross and Mirowsky, 2006 forthcoming). For women, education makes the lack of other socioeconomic resources less harmful since it serves as the alternative. Extending their resource substitution view into religious context, it can be expected that the existence of religious resources make the absence of other socioeconomic resources less harmful.

To summarize, in comparison with their well-to-do counterparts, lack of resources and alternatives in the secular setting makes socially disadvantaged groups are more likely to (1) rely on religious participation for meaning seeking and cognitive sophistication; (2) use religious coping strategies such as prayers and meditations to deal with life stressors; and (3) turn to religious teachings and conversations with deities for knowledge seeking and network development.

Looking back to the previous studies, although some qualitative and quantitative studies have examined the relationships between religious participation and health, almost no published studies, to my knowledge, have explored socioeconomic differences in religiosity in China. Therefore, this study will fill in the research gap by extending Western theories into Chinese context with operational alterations. Given the big regional socioeconomic differences in China, I will concentrate on two levels of SES: one is individual-level SES indicated by education and the other is community-level SES manifested by rural/urban residence and regional GDP per capita. I propose that levels of SES are negatively related to religious participation and individuals with disadvantaged SES tend to get more benefits from religious practice than their well-to-do counterparts.

Psycho-Social Resources and Life Stressor

In the U.S., it is well documented that there are socioeconomic disparities in psychosocial resources. In general, high SES individuals tend to have more sense of

personal control, be more optimistic, and enjoy more social support and information exchanges than low SES individuals. These available resources not only decrease the number of stress encounters, but also buffer the deleterious effects of stress when it does appear. In this study, I integrate the available resources and life stressors in order to examine: (1) how the effects of SES and religion on well-being might differ across them; (2) how the proposed psycho-social resources such as optimism, making own decision, and life stressors such as problems in Activities of Daily Living (ADLs), loss of family care or spouse might explain some of the gender differentials in emotional and cognitive well-being.

SUMMARY OF HYPOTHESES

Based on the theoretical underpinnings and empirical findings discussed above, the following series of hypotheses are yielded:

Cross-Sectional Relationships

Differential Involvement

Hypothesis 3.1: Relationship between individual-level-SES and religious participation: the key Individual-Level-SES—education—is associated negatively with religious participation; that is, low-educated individuals report higher levels of religious participation in comparison with their higher-educated counterparts.

Hypothesis 3.2: Relationship between community-level-SES and religious participation: community-level-SES indicators such as rural/urban residence and regional GDP per capita are associated negatively with religious participation; that is; individuals with lower community-level-SES report higher levels of religious participation in comparison with individuals with higher community-SES.

Hypothesis 3.3: Females report a higher level of religious participation than males.

Hypothesis 3.4: Gender gap in religious participation increases with education.

Hypothesis 3.5: Statistical adjustments for the possible confounders such as sociodemographic factors, life stressors, and psycho-social resources reduce the differences between females and males in levels of religious practice.

Differential Impact

Hypothesis 3.6: Religious participation and SES interact to affect emotional well-being indicated by distress such that lower SES people tend to benefit more from religious practice than the higher SES ones.

Hypothesis 3.7: Religious participation and SES interact to affect cognitive well-being such that lower SES people tend to benefit more from religious practice than the higher SES ones.

Longitudinal Relationships

Hypothesis 3.8: Religious participation, gender, and levels of SES predict distress over time.

Hypothesis 3.9: Religious participation, gender, and levels of SES predict cognitive well-being over time.

DATA

Data to test these ideas come from the 1998 Chinese Healthy Longevity Survey and the 2000 and 2002 follow-ups. The baseline survey contains 9,093 respondents aged 77 - 122. In 2000, 4,831 respondents remained and were re-interviewed, while 3,368 respondents were deceased and 894 were lost to follow-up. Finally, there are 2,642 respondents who were first interviewed in 1998 and re-interviewed both in 2000 and

2002, while another 1,604 respondents were dead and 585 were lost to follow-up. The overall data sets are socially and economically diverse, which is consistent with the purpose of this chapter to investigate social inequality and mental health disparities, although quite a lot of the old people are illiterate, which undermines the variability in levels of education a little bit. For instance, a series of social stratification indicators such as professions before age 60, current economic conditions, various neighborhood economic indicators, and social mobility are exhaustively included. Likewise, the comprehensive coverage of the geographic provinces and municipalities (22 out of 31) in the survey adds an additional variability into the data set. Specifically, respondents were from 631 randomly selected counties and cities of the 22 provinces where Han Chinese are the majority and the total population of which is 980 million, 85.3 percent of the total population of China. The response rate is 88%. Assessment of the data reliability have been conducted and been found to be of high quality. Please see Yi et al. (2001) and Yi and Vaupel (2002) for details about the data, its quality, calculation of sampling weights, and initial analyses.

MEASURES

Dependent Variables

Distress. Psychological distress is measured by a 4-item index. Respondents were asked: how often do you feel 1) fearful or anxious, 2) lonely and isolated, 3) useless, and 4) as happy as younger? Responses to the first 3 distress items were coded never (1), seldom (2), sometimes (3), often (4) or always (5), and responses to feeling happy were coded in reverse. The index is the mean response to the 4 items, scored 1 - 4. All items load on a single factor above .4; the alpha reliability is .55 (.67 in 2000 and .68 in 2002);

and the mean is 2.64 (2.35 in 2000; 2.45 in 2002), with a standard deviation of .63 (.75 in 2000 and .82 in 2002).

Cognitive Functioning. Cognitive functioning is measured by a 24-item (See Table 1.1) index from the Mini-Mental State Examination—MMSE (Folstein, Folstain, and McHugh 1975). The MMSE has been used extensively to measure the cognitive functioning of older adults across cultures, including Chinese; and it has been found to be a valid measure of cognition among Chinese population. However, the Chinese version of MMSE adopts some appropriate adjustments to make the questions more understandable and answerable among ordinary Chinese oldest old, the majority of whom are illiterate (Yi and Vaupel, 2002). For instance, the Chinese MMSE asks respondents to name as many foods as possible (in one minute) instead of writing a sentence, which is a quite difficult task for the elderly. Overall, respondents were asked by 5 orientation related questions (naming the current time, animal year, season, festival, and county), one naming foods question, 6 word recall questions (3 words are mentioned and respondents are asked to repeat them two times), 5 calculations questions (respondents are asked to subtract 3 from 20, then 3 from the previous resulting, and so on), 3 language questions (repeating a sentence and naming simple items such as pen and watch that are shown to the respondents), 1 drawing question, and 3 comprehension questions (respondents are asked to take paper in their right hand, fold it, and then put it on the floor). Responses to the questions were coded wrong (0), correct (1). Recommended in the literature, "Not able to answer" item was coded "0" (Zhang 2006). Then a continuous measure is calculated by scoring one point for each correct answer. Therefore, it is a sum response to the 24 times, scored 0-30. All items load on a single factor above .5; the alpha reliability is .91 (.90 in 2000 and .89 in 2002); and mean is 21.11(20.41 in 2000 and 19.60 in 2002), with a standard deviation of 8.98 (8.79 in 2000 and 9.04 in 2002) in 1998.

Independent Variables

Religion Participation. A simple and straightforward question on religious activities was asked: "at the present time, do you participate in any religious activities?" And the responses options are: almost everyday, sometimes, and do not participate at all. In order to keep as much information as possible, the response categories remain in their categorical orders in the following analyses. At the baseline—1998, there are 16.4% of the respondents reported participating religious activities almost everyday or sometimes.

Gender. Gender is coded 0 = male and 1 = female, and 60% of the sample is female.

Individual-Level-SES. I use education (in years of former schooling completed) as indicator of individual-level-SES.

Community-Level-SES. Two indicators are used to capture the neighbor-level-SES. Rural vs. urban residence is coded 0 = rural and 1 = urban, and 62% of the sample lives in a rural area. The second indicator is regional economic development, which is measured by the gross domestic product (GDP) of a province divided by the size of its population. 22 provinces are coded into 6 ordinal categories according to their regional GDP per capita (data provided by the National Bureau of Statistics of China). Beijing, Tianjing, and Shanghai are coded 6 with the highest GDP per capita ($4328-$5457), followed by Jiangsu, Zhejiang, and Guangdong as 5 ($2867-$3344); Liaoning, Jilin, Fujian, and Shandong as 4 ($2072 to $2447); Hebei, Shanxi, and Helongjian as 3 ($1530-$1798); Henan, Hunan, Hubei, and Chongqing as 2 ($1258- $1364); and Anhui, Sichuan, Guangxi, Shannxi, and Jiangxi as 1 ($1050-$1195).

Stressors. Functional limitation is assessed by a sum index of activity of daily living, which measures elders' level of independence in daily living composed by the ability of eating, dressing, transferring, using toilet, bathing, and continence. Responses

are coded: “without assistance” (0), “with assistance” (1). I summed responses to create an ADL index (α =.87). Loss of spouse is measured by (1) v.s. all the others (0). Likewise, loss of family care when sick is measured by (1) v.s. all the others (0). In addition, respondents who lost their living spouse anytime from 1998 to 2002 are coded 1 vs. all the others. Similarly, old adults who lost their family care when sick are also coded 1 vs. all the others.

Psychological resources. Optimism item ask respondents about: “how often do you look at the bright site of the things?” Responses to this item were coded never (1), seldom (2), sometimes (3), often (4) or always (5). Self-decision making is measured by question: “how often do you make own decision?” Responses are coded in an increase (1-5) manner such that the high score is more self-directed.

Engagement. Engagement in the daily activities is created by the following four items: gardening, reading, watching t.v. or listening to the radio, and playing cards or mah-jong. Responses were coded never (1), sometimes (2), almost everyday (3). I averaged responses to create the index (α =.61).

Lifestyle. Exercise is measured in response to the question: “do you exercise at present?” It is scored no (0) vs. yes (1). (Twenty-seven percent of the sample reports exercising). Similarly, smoking is measured in response to the question: “do you smoke at present?” It is recoded no (0) vs. yes (1) and around 17% of the sample is current smokers. Heavy drinking is determined by the following three questions: “do you drink alcohol at the present time? If drink, how much per day on average do you drink? And what kind of alcohol do you mainly drink?” The measurement unit employed to gauge the amount of drinking is “liang”, which is around 50 grams and it is widely used as a unit to measure alcohol consumption in China. The response categories for the types of drink are liquor, wine, and rice wine. Heavy drinkers (coded as 1) are identified from

drinking more than two liang (100 gram) of liquor, or six liang (300 gram) of wine, or 8 liang (400) of rice wine per day; otherwise, the subjects is coded as 0.

Other control measures. Age is coded in number of years (average age = 92). Ethnicity is coded 0=minorities, and 1=Han majority, and 92.8% of the sample is Han in 1998. Marital status compares the currently married (coded 1) with non-married (coded 0). At baseline, 16.4% of the sample is married.

RESULTS

Gender and SES Differentials in Levels of Religious Participation

In order to examine gender and SES differences in levels of religious participation, in table 3.1, I regress religious participation on gender, two-level-SES, and the basic controls. Specifically, Model 1 and Model 2 assess the focal associations between gender, SESs, and religious participation. Model 3 to Model 5 adjust for the possible psycho-social resources and physical stressor to examine the change of the focal associations.

In general, results in Model 1 of Table 3.1 support hypothesis 3.1 and 3.3, but contradict to hypothesis 3.2. As expected, female report much higher levels of religious participation than males ($b=.134$, $p<.001$), and educational attainment is associated negatively with religion. Besides, there is significant ethnicity difference, indicating that Han women report the highest level of religious participation, followed by Han men, Minority women, and Minority men. In addition, both age and marital status are associated negatively with religion: the younger and non-married elderly report higher levels of religious participation in comparison with the elder and the married ones. Opposite to my expectation, however, community level SES—urban residence and regional GDP per Capita are associated positively with religious participation, that is,

urban and wealthier area residents report much higher levels of religious participation than the rural and poorer area counterparts. Thereby, hypothesis 3.2 is not supported by the data. Individual-level-SES and community-level-SES exhibit different patterns in their relation to religious participation.

In Model 2, I include gender-by-education interaction. The positive education × female coefficient (b=.011, p<.01) supports my fourth hypothesis: gender and education interact such that the gender gap in religious participation increases with education. Figure 3.2 shows that when adjusting for the basic controls and the community level SES, levels of religious participation diverge substantially as levels of education increase: While religious participation increases with education for females, religious participation decreases with education for males. I also tested for the interactions between gender and community SES indicators, but none of them are significant.

Adjusting for the psycho-social resources and physical stressor in Model 3 to Model 5, the education × female coefficient decreases substantially (from .011 to .002) and engagement × female alone explains around 80 percent of this decrease. This suggests that gender differences in religiosity across education are primarily due to gender differentials in engaging in various activities in general (see Figure 3.3). The proposed adjustments, however, has little effect on the gender differences in religious participation. Thus, my fifth hypothesis is not support by the data. However, although the psychosocial resources fail to explain the gender differences in religiosity, they account for nearly 54 percent of the urban/rural differences in religious participation. It is also worthy of mentioning that having problems in activities of daily living is highly correlated with religious participation, which indicates that the practice of religion in China is probably outward at large and is likely to be restricted by physical capability.

Gender and SES Differentials in the Effects of Religious Participation on Mental Health –Cross-Sectional Results

Table 3.2 tests the hypothesis on how religion, levels of SES, and physical stressor interact to affect psychological distress. In Model 1, I observe that on average: (1) Females report more distress than males; (2) Urban residents report less distress than rural residents; (3) Both religion and education are associated negatively with distress; and (4) Regional GDP per capita is not significantly related to distress. However, by adding a series of religion and SES interactions—religion × gender, religion × education, religion × urban, and religion × regional GDP into Model 2 separately, only religion × Regional GDP coefficient is significant and this significance holds across the rest of the models. It reveals that the association between religious participation and distress depends on regional economic conditions and the beneficial effects of religion on psychological well-being are more for the poorer area residents (see Figure 3.4). Likewise, although people with severe daily disabilities are less likely to participate in religious activities in general, Model 4 suggests that if they do attend, they tend to get more psychological benefits from the practice (see Figure 3.5). It is also noteworthy that the proposed psychosocial resources (see Model 3) are highly associated with distress and they explain a large portion of its variation: Individuals who are engaged in more activities, who are more optimistic and self-controlled, are less likely to be psychologically distressed. Collectively, variables in these sequential models account for approximately 17 percent variation in distress.

I repeat the same modeling strategies in the analyses of cognitive well-being (see Table 3.3 and 3.4). Results generally follow the similar patterns with three exceptions. First, the coefficient of religion × female becomes significant at .05 level in model 2 of Table 3.3 ($b=.651$, $p<.05$). Solving the interaction term indicates that the slope of female

is more positive than male, that is, elderly females get more cognitive benefits from religious participation than elderly males (see Figure 3.6). Second, the coefficient of religion × urban residence is on the edge of significance in model 2 of Table 3.4 (b=-.505, p<.1). This indicates that religious participation is more beneficial for the rural residents although urban residents have the higher initial levels of cognitive functioning (see Figure 3.7). Contradictory to the prediction, however, the effects of religion on cognitive functioning is more for the wealthy area residents than for poor area people in model 2 of Table 3.5 (see Figure 3.8), which is manifested in the positive and significant coefficient of religion × regional GDP (b=.195, p<.01). Therefore, hypotheses 3.6 and 3.7 are partially supported by the data: While religion benefits cognitive functioning more for wealthier area residents, it benefits emotional well-being more for poorer area people.

Gender and SES Differentials in the Effects of Religious Participation on Mental Health—Longitudinal Results

Table 3.6 and 3.7 summarize the longitudinal findings. The overall patterns in Table 3.6 are quite similar to findings in Table 3.2. Religious participation, education, and urban residence are associated negatively with distress at wave III, while distress in wave I and II, and regional GDP are associated positively with distress at wave III. Likewise, those psycho-social resources tend to promote emotional well-being, while life stressors such as loss of family care during 1998 to 2002 period tend to take emotional toll. In addition, the effects of distress at earlier waves on distress at wave III depend on both levels of religious participation and education, which is indicated by the significant interaction terms: distress2 × religion and distress1 × education (see Model 3 of Table 3.6). However, solving for these interactions revels that the detrimental effects of distress at previous levels on distress at wave III are actually more for people with higher levels of education and religious participation (see Figure 3.9 and Figure 3.10). Collectively, the

variables in Model 5 of Table 3.6 account for around 15 percent variation in distress in wave III. Therefore, hypothesis 3.8 is supported by the data.

Applying for the same modeling strategies, I get Table 3.7, where religion no longer plays significant role in affecting cognitive functioning over time while regional GDP becomes a strong predictor of cognitive well-being at wave III. Therefore, this data set fails to support hypothesis 3.9.

Summary of Findings

Findings generally support my hypotheses: (1) Education is negatively associated with religious participation; (2) Female report a higher average level of religious participation than males and the gender gap in religious participation increases with education; (3) Controlling for the psycho-social resources and physical stressor does not reduce the gender differential in religious participation, although they contribute partially to the education $\times$ gender on religious participation; (4) Religious participation has stronger negative association with distress among poorer area residents although its negative association with cognitive functioning goes to the opposite direction; (6) Females get more cognitive benefits from religious participation than their male counterparts; and (7) Religion, gender, different indicators of SES are strong predictors of distress over time.

However, I also find some unexpected patterns, which merit further scrutiny: (1) community-level-SES such as urban residence and regional GDP are positively related to religious participation; and (2) the effects of earlier disadvantaged emotional status on later ones depend on both religion and education, yet the way they take effects is quite surprising: the harmful effects of the previous distress on the later ones are larger for the old adults with higher levels education or religious participation.

DISCUSSION

Interest in the implications of socioeconomic differences in religious participation has increased recently. However, many—perhaps most—empirical work in this area has relied upon cross-sectional data or focused on Western Judeo-Christian societies. Far fewer studies have probed these relationships within Asian context where religion are understood and practiced differently. Therefore, in this chapter, I contribute to the literature on religion, SES, and health in at least four ways: (1) by using data of a longitudinal survey; (2) by studying the interplay among religion, SES, and mental health among the elderly Chinese in China; (3) by examining the effects of two-level-SES; and (4) by exploring variations in the effects religious participation on emotional and cognitive well-being by gender.

First, my findings add to the modest but growing body of knowledge concerning religious participation and its links with emotional and cognitive well-being across levels of socioeconomic status. In particular, they offer important confirmation that religious participation and indicators of socioeconomic status may have longitudinal effects on, in addition to cross-sectional associations with, well-being. Moreover, findings also suggest that distress at earlier levels will interact with religion or education in affecting distress at later wave. The impact of having distress symptoms at earlier stages (wave I or II) on distress at final stage actually more for the highly educated and religious elderly. The evidence for longitudinal, as well as cross-sectional, links between religion in China and mental health makes it more difficult to dismiss these results as spurious, and brings us closer to establishing causal relationships among religion, levels of SES, and mental health outcomes.

Second, I also see that the impact of religious participation on mental health differ across regional economic status. It shows that poorer area residents get more emotional

but less cognitive benefits from religious participation than their well to do counterparts. Although this finding seems contradictory at fist glance, it makes sense in several ways. First, higher self-reported religious participation does not mean deeper involvement. Although residents in the wealthy areas report more religious participation than poorer area residents, religion may have different meaning for them. While poor people pray for better harvest, warm housings, and survival; rich people prayer for promotions, more money, and better health. According to resource substitution view (Ross and Mirowsky 2006), the presence of religion makes the absence of other resources less harmful. Therefore, poorer people weight more on religion since they have limited alternatives, thus, they are likely to be benefited more psychologically from the practice. On the other hand, the reason why religion benefits cognitive functioning more for the wealthy area residents is probably because the wealthy area residents have higher average level of education, which is directly and highly correlated with cognitive well-being. In this objective domain, religion can hardly make any difference. Meanwhile, individuals with more years of schooling may rely more on the doctrinal aspect of religion for teachings on life philosophy and world views while the less educated and the poorer may turn to religion only for practical purposes, thus, get less intellectual benefits.

Third, in contrast to the previous studies based solely on the individual level SES (Schieman et al. 2006), this study includes community-level-SES. Since I primarily focus on very late life when income and occupation are no longer applicable and wealth are hard to measure, only education is used as the indicator of individual level SES here. Given that the frequently used neighborhood index in the United States does not seem to be fit into Chinese society very well, in this chapter, I use the available urban/rural residence and regional economic status instead. China has a marked rural/urban division in education, economic development, social welfare and etc. Rural residents, by large,

have limited access to education, social welfare, and are relatively poorer. In addition, China also has sharp regional differences with richer area residents enjoying much better living standards and various resources. Because of more opportunities and resources, even if an individual occupied lower SES in urban or wealthy areas, he or she might still be better off. Therefore, I argue that living in the urban or wealthy area means something particular and it has independent relationships with religious participation and impacts on mental health.

Fourth, huge gender differences in religious participation and their association with cognitive functioning are found in this study. First of all, old women are much more involved in religious activities than old men, and this is partially explained by women's higher tendency of participating in any kind of activity, either socially or individually. In addition, education and religion interact with gender to affect cognitive functioning such that women tend to have more cognitive benefits from both education and religious participation than men. Therefore, Krause's differential involvement and impact view explaining race differences in religion and its relationship with health in the US are well applicable within Chinese context when making gender comparison. And Ross and Mirowsky's resource substitution argument is further confirmed within Asian context. In the traditional Chinese society, women occupy low social status throughout their lives. Most women do not have access to schooling and lack economic roles outside the family. This pattern of male domination extended well into the first half of the 20th century and some of its residues continued into the 1980s (Honig and Hershatter 1988; Stacey 1983; Wolf 1985). In this study, although respondents were interviewed in the end of 20th century when women's social status have improved substantially, the majority of them were born and got education at the beginning of 20th century, when women still had markedly inferior status to men.

Although this study has provided answers to several significant questions, future research is needed on several fronts. First, it will be more profitable to have more sophisticated measures. For example, there are other aspects of religious measures besides religious participation that is considered in this study. In addition to the widely used religious attendance, western investigators have increasingly realized that religion is a multidimensional construct and different aspects of it may have important relationship with individual lives (Ellison and Levin 1998; Idler et al. 2002). Therefore, in light of the apparent significance of religious participation for individual psychological well-being, we need to know more about other forms of religiosity or spirituality such as religious affiliations, personal spiritual experiences, spiritual well-being, religious meaning, coping, and support, and their associations with mental health. In addition, improved measures of community level SES are also greatly needed. It will be useful to know how community-based SES is related to individual mental health. Western well-developed neighborhood disadvantage index can be applied into Chinese context with proper alterations. For instance, one of the most frequent used indicator—mother headed households in the census tract can be replaced by measures that are suitable in China such as the average level of education, gender gap in education, GDP per capita in a particular city or county.

Second, in order to draw more general conclusions, it would be valuable to examine the proposed relationships for other age groups, in particular, current middle-aged adults in China. In light of the apparent significant associations among religion, SES, and mental health among the oldest old, it would be worthwhile to further explore whether these relationships hold for the younger generations whose socioeconomic disparities are more apparent and much easier to be identified. According to Shu (2004), the early 20th century witnessed the establishment of greater educational opportunities for

both sexes in urban China. Especially after Communists came to power in 1949, China's educational system expanded rapidly. This is especially true in the urban areas where the female illiteracy rate dropped to less than 5 percent for those born in the 1960s, and more than 92 percent of the women in this younger cohort got some secondary education (Lavely et al. 1990; Research Institute 1991). Meanwhile, from 1949 to 1976, the number of elementary schools, middles schools, and colleges increase dramatically, providing more education opportunities for both sexes. Collectively, the general improvement of mass education, the closer of gender gap in schooling, accompanying with availabilities of high education add additional variability to individual level education and socioeconomic disparities, all of which are expected to make the similar analyses more informative and persuasive among younger generations.

Third, the particular living arrangement—elderly Chinese are usually living with their adult children, sons in particular—suggests that it will be helpful to consider the socioeconomic status of adult children living with their elderly parents in order to see how children's SES affect the mental health of their elderly parents. This is particularly the case for elderly women whose average education level is extremely low, which elevates the significance of their children whose years of schooling, occupations, and income directly affect where they live and how they live. For the very old people, while education earned in the earlier adulthood is more likely to transfer into personality and psychosocial resources, the SES of their adult children is expected to be more highly correlated with their current economic conditions, which is well associated with psychological and even cognitive well-being. Therefore, future survey may consider including this additional piece of information.

Although there is much additional work to be done, I believe that this study has made a significant contribution to the emerging literature on religion, SES, health and

well-being. To the best of my knowledge, this is the first longitudinal examination of the effects of two-level-SES and religion on mental health in China, and the results suggest that this may be an important, albeit largely overlooked, topic for religion-health researchers. Further work along the lines sketched above can lead to more robust and generalized relationships with the improvement of measures and extension of survey toward younger age groups.

CONCLUSION

China is a country with the biggest population in the world and it is aging at an extremely rapid speed. This may inevitably lead to severe social problems given the deficit in medical supplies at the society level and social support at the family level. Under these difficult circumstances, looking for social institutions and processes that are particularly relevant to individual health and well-being becomes increasingly imperative in the contemporary China. Health care of the elderly is not merely a task of the government or family; rather, it is a systematic mission requiring endeavors at different levels: society, family and individual themselves. By focusing on the individual level health promoters, this dissertation examines the role of education and religion—individually and interactively—working as the health care supplements in maintaining health and well-being of the very old Chinese.

On the broader level, this dissertation, thereby, is important in many ways: First, it encourages the policy makers to be aware of the effects of individual level health promoters such as education, religion, and community constructions on health and well-being, and make an optimal allocation of these social resources afterwards to alleviate a variety of health problems associated with aging. Second, by exploring social causes of health disparities among elderly Chinese, Western theories on aging and health will be largely enriched. And this makes the cross-cultural comparisons possible, which may provide insights in developing more comprehensive sociological theories in mental health and aging worldwide. In sum, it is expected that this dissertation will encourage the realization and sharing of social problems and experiences from other nations and cultures, and become one of the few attempts of advancing theories on aging and mental health.

More specifically, in the first chapter, education is found to impact emotional and cognitive well-being of elderly Chinese in general, and its salutary effects are more evident for elderly women. The resources compensation or substitution view, thereby, is supported by Chinese data. Personal abilities shaped by schooling and their positive health benefits are likely to cumulate and persist throughout the life course. Education is much more than high quality work force; it is also about positive lifestyles and being healthy.

Fortunately, the importance of education is well recognized by the Chinese government. After the establishment of the PRC, Chinese government has long been emphasized the development of mass education and made tremendous achievements over the last fifty years. According to an official estimation by Chinese government in 2007[5], currently, approximately 91% of the population has got elementary level education and illiteracy is about to eliminate. Meanwhile, education with different levels and forms, including higher education, adult education, vocational education, and international education intercommunion is also developing rapidly. Given that education is strongly associated with individual health, all these endeavors in improving mass education in China is going to signal another huge leap in mass health in China in the next decades.

Nevertheless, education and mental health associations found in the first chapter are all about the current oldest old Chinese; we know very little about other population segments living in the different historical scenarios and having different social experiences. Whether or not similar associations on education and mental health will be found among younger generations is not clear. Therefore, future data cover longer period of time starting from younger adulthood are needed. We need to distinguish between

[5] http://news.xinhuanet.com/ziliao/2005-11/03/content_3725854.htm

cohort effects and the real effects of education before establish the universal education and health connection in China.

In the second chapter, religious participation is found to be correlated with various health indicators, including mental health, physical health, and survival. Religion is not only directly but also indirectly associated with well-being and its indirect effects primarily go through psychological resources and healthy lifestyles rather than social resources, the important mediators that are frequently used in the Western congregation-based religions. Therefore, religion is more than institutional attendance. Non-congregational religions are likewise beneficial to health.

If older generations in general are quite conservative in identifying themselves as religious, younger generations with increasing spiritual needs and under less political pressures are much more likely to speak out their religious preference and practice it publicly in the contemporary China. This change from the private to the outward behavior-based practice facilitates the quantification of religion and spirituality, and makes China an ideal case for future research on religion and health. Therefore, future well-developed survey questions covering multiple aspects of religiosity targeting on younger generations are potentially possible and greatly needed in order to generalize the findings in this dissertation to other age groups.

After identifying individual effects of education and religion on health, in the third chapter, the interplay among gender, levels of SES, religion, and mental health is then explored. Consistent with expectations and Western findings, elderly females are more religiously involved and enjoy more cognitive benefits from religious participation than elderly males. However, levels of SES display different patterns in their relations to religious participation: while individual-level SES is associated negatively with religious participation, community-level SES is associated positively with religious participation.

The effects of religion on mental health across community-level SES are even more complicated: while residents in poor areas enjoy better emotional benefits from religious practice, they are worse off in terms of cognitive well-being compared to people in wealthy areas.

Although these findings make sense in several ways, the inconsistencies may, to some extent, flag the potential measurement errors. It is not clear whether these results are reflecting the social reality or simple due to the measurement errors. Therefore, in the future, more sophisticated measures on both religion and levels of SES are imperative. Moreover, focusing solely on elderly people makes some aspects of SES such as income and occupation inapplicable. In order to get a more comprehensive understanding of the current economic conditions of the elderly, we may consider of surveying the SES of their adult children such as household income.

In a nutshell, although the three-wave CHLS provides the nationally representative data in China, covers a wide range of the variables of interest, and generates the neat findings throughout the chapters, it lacks the comprehensive and deep information on some dependent and mediating variables, which needs the follow-up in-depth qualitative data, serving as the supplement.

Specifically, those weaknesses of the survey data are as follows: First, one of the important dependent variables, religious participation, is only briefly mentioned in the survey. Although it appears to be quite significant in predicting various health outcomes in the analyses, we know very little about (a) respondents' real understanding of religious participation; (b) what types of religion the respondents and their children actually practice; (c) how they practice; (d) whether there is intergenerational conflicts in religious practice and beliefs; and (e) whether and why there are gender differences in religious practice and benefits. Second, years of schooling of the respondents are provided in the

survey; however, we know nothing about the socioeconomic status of their adult children. Given that elderly Chinese are usually living with their children, the education and professions of their adult children may play significant roles in indicating the family economic conditions and may eventually affect the health status of their elderly parents. Last but not the least, little information on medical care and living conditions are provided at community level in this survey. Thus, we may have difficulties of identifying the independent roles of communities in promoting health of the elderly. All these issues call for qualitative interviews to provide an efficient means of collecting additional primary data and thus to serve as the prelude for more sophisticated survey in the future.

Therefore, the end of my dissertation signals a new start of my exploration. I will seek funding support to conduct the follow-up in-depth interviews and continue my research on religion, SES, and health among elderly Chinese. I plan to sample around 30 elderly Chinese and inquire deeply on their current economic conditions, their understanding of religion, how they practice it, and their health status.

Since my target population (very old Chinese) may be difficult to sample by using simple random sampling methods, I will instead, apply the snowball sampling method. Initially, I will randomly select a group of oldest old, and then ask them to introduce me to other potential subjects of this population whom they happen to know. Altogether, 30 in-depth interviews (one half males and one half females) of individuals between 80 and 100 years of old will be conducted in the selected city—Suzhou, China.

The selection of Suzhou as my target city is determined by (1) its geographic and economic position as a well-developed large city in the southeastern part of China; (2) its familiarity to me, with respect to native dialects, culture, and traditions; (3) its high population density; (3) its long history, and (4) its openness, which collectively, have great academic merits. Specifically, first, it is located at the heart of the Yangtze River

Delta, which is the most developed part in China. Second, it is close to Shanghai and has an advanced system of railways, highways, waterways, and skyways. Due to its convenient transportation, the city has embraced a wide range of cultures, including that from other parts of China and even abroad. Third, it has 2500 years of history and is the cradle of Wu culture, and is the oldest towns in the Yangtze Basin. In this place, Chinese traditions and cultures are successfully accumulated and carried on. In a nutshell, Suzhou is the center of both Asian traditions and the Western cultures, thus, it is unique in terms of the diversity and richness in many aspects, including religions, lifestyles, living arrangements, and etc.

For you reference, I include a brief interview script and a budget form. In terms of timelines, I plan to: (a) conduct interviews in June, 2007; (b) finish data transforming, coding, and analyzing by August, 2007; (c) present results in the annual meetings of American Sociological Association (ASA) and Society for the Scientific Study of Religion (SSSR) in 2008; and (d) eventually publish some parts of my dissertation in the near future.

Table 1.1. The Chinese Version of the Mini-Mental State Exam (MMSE) in CHLS

Items	MMSE questions	Score (Total=30)
1. Orientation	What time of day is it right now (morning, afternoon, evening)?	1
	What is the animal year of this year?	1
	What is the date of the mid-autumn festival?	1
	What is the season right now?	1
	What is the name of this county or district?	1
2. Naming foods	Please name as many kinds of food as possible within 1 minute (1 point for each food and 7 points for those who name 7 or more foods).	7
3. Restriction	Please repeat these three objects—table, apple, and cloth.	3
4. Calculation	I will ask you to spend $3 from $20, and then you must spend $3 from the number you arrived at and continue to spend $3 until you were asked to stop.	5
5. Copy a figure	The individual is asked to draw a figure of overlapping pentagons.	1
6. Recall	Name the three objects learnt earlier—table, apple, and cloth.	3
7. Language	Naming pen and watch	2
	Repeating the following sentence: "What you plant, what you will get."	1
	The individual is asked to follow the interviewer's instruction: "Take the paper using right hand, fold it in the middle using both hands, and place the paper on the floor."	3

Table 1.2. Distress Regressed on Education, Controlling for Sociodemographics (Model 1), Occupation before Age 60 (Model 2), Current Economic Independency (Model 3), Psychological Resources (Model 4), and Lifestyles (Model 5): Oldest Old Chinese, 1998

	Model 1	Model 2	Model 3	Model 4	Model 5
Education	-.017***	-.013***	-.012***	-.009***	-.003
	(.002)	(.002)	(.002)	(.002)	(.002)
Sociodemographic					
Female	.083***	.093***	.084***	.067***	.042*
	(.016)	(.016)	(.016)	(.016)	(.016)
Han	-.185***	-.176***	-.175***	-.085**	-.074**
	(.027)	(.027)	(.027)	(.026)	(.026)
Age	.004***	.004***	.004***	.003**	.001
	(.001)	(.001)	(.001)	(.001)	(.001)
Urban	-.076***	-.058***	-.048**	-.015	.008
	(.015)	(.015)	(.016)	(.015)	(.015)
Married	-.068**	-.062**	-.056**	-.055**	-.051**
	(.020)	(.020)	(.020)	(.019)	(.019)
Economic Conditions					
Occupation before age 60		-.027***	-.023***	-.015*	-.008
		(.007)	(.007)	(.007)	(.007)
Economic independence			-.063**	-.037+	.003
			(.022)	(.021)	(.021)
Psychological Resources					
Optimism				-.220***	-.206***
				(.008)	(.008)
Making own decision				-.048***	-.042***
				(.007)	(.007)
Lifestyle					
Engagement					-.188***
					(.021)
Smoke					-.005
					(.018)
Heavy drink					-.068*
					(.027)
Exercise					-.069***
					(.016)
Intercept	2.828	2.850	2.851	3.773	3.936
R^2	.050	.052	.053	.146	.160

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)
NOTE: N=7764; Shown are metric coefficients with standard errors in parentheses.

Table 1.3. Distress in 2000 and Distress in 2002 Regressed on Education, Controlling for Sociodemographics (Model 1), Economic Conditions (Model 2), Psychological Resources (Model 3), Lifestyles (Model 4) and Loss of Social Connections (Model 5): Oldest Old Chinese

	Distress in 2000 (N=3891)					Distress in 2002 (N=1833)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Age	.001	.001	-.001	-.001	-.001	.001	-.001	-.001	-.004	-.004
	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)
Female	.104***	.087***	.085**	.073*	.071*	.073+	.069	.070	.026	.026
	(.027)	(.027)	(.027)	(.029)	(.029)	(.043)	(.044)	(.044)	(.046)	(.046)
Han	.067	.067	.087*	.110*	.108*	.134*	.146*	.183**	.185**	.178**
	(.043)	(.043)	(.044)	(.043)	(.043)	(.067)	(.067)	(.068)	(.067)	(.067)
Urban	-.205***	-.187***	-.181***	-.148***	-.148***	-.253***	-.216***	-.200***	-.164***	-.166***
	(.025)	(.026)	(.026)	(.026)	(.026)	(.040)	(.042)	(.042)	(.042)	(.042)
Married	-.078*	-.070*	-.073*	-.070*	-.113***	-.053	-.046	-.043	-.033	-.092+
	(.031)	(.031)	(.031)	(.031)	(.033)	(.052)	(.052)	(.051)	(.051)	(.055)
Education	-.020***	-.018***	-.017***	-.007+	-.007+	-.017**	-.010	-.009	-.002	-.001
	(.004)	(.004)	(.004)	(.004)	(.004)	(.006)	(.007)	(.007)	(.007)	(.007)
Distress in 1998	.198***	.197***	.169***	.150***	.148***					
	(.019)	(.019)	(.020)	(.020)	(.020)					
Distress in 2000						.229***	.228***	.173***	.135***	.131***
						(.026)	(.026)	(.028)	(.029)	(.029)
Occupation before age 60		.006	.007	.021+	.020+		-.031+	-.025	-.013	-.012
		(.011)	(.011)	(.011)	(.011)		(.018)	(.018)	(.018)	(.018)
Economic independence		-.096**	-.094**	-.048	-.045		-.076	-.062	-.031	-.044
		(.035)	(.035)	(.035)	(.035)		(.055)	(.055)	(.054)	(.054)
Optimism (1998/2000)			-.073***	-.060***	-.059***			-.129***	-.115***	-.115***
			(.016)	(.015)	(.015)			(.030)	(.030)	(.029)
Making own decision (1998/2000)			.006	.011	.012			-.048**	-.038*	-.040*
			(.012)	(.012)	(.012)			(.017)	(.017)	(.017)

Table 1.3. Continued

	Distress in 2000 (N=3891)					Distress in 2002 (N=1833)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Engagement (1998/2000)				-.228***	-.224***				-.316***	-.310***
				(.034)	(.034)				(.055)	(.055)
Smoke (1998/2000)				.044	.044				-.051	-.051
				(.030)	(.030)				(.050)	(.050)
Heavy drink (1998/2000)				-.006	-.008				.048	.054
				(.046)	(.046)				(.083)	(.082)
Exercise (1998/2000)				-.106***	-.104***				-.029	-.029
				(.026)	(.026)				(.040)	(.040)
Loss of spouse (1998-2000)					.205***					
					(.059)					
Loss of family care (1998-2000)					.157*					
					(.062)					
Loss of spouse (2000-2002)										.205*
										(.085)
Loss of family care (2000-2002)										.213*
										(.088)
Intercept	1.724	1.783	2.091	2.520	2.506	1.939	2.009	2.802	3.461	3.505
R^2	.091	.092	.097	.114	.118	.096	.098	.111	.128	.133

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)
NOTE: Shown are metric coefficients with standard errors in parentheses.

Table 1.4. Low Life Quality Regressed on Education, Controlling for Sociodemographics (Model 1), Occupation before Age 60 (Model 2), Current Economic Independency (Model 3), Psychological Resources (Model 4), and Lifestyles (Model 5): Oldest Old Chinese, 1998

	Model 1	Model 2	Model 3	Model 4	Model 5
Education	-.013***	-.008**	-.007*	-.004	.004
	(.002)	(.003)	(.003)	(.003)	(.003)
Sociodemographic					
Female	-.022	-.009	-.018	-.036*	-.054**
	(.019)	(.019)	(.019)	(.018)	(.019)
Han	-.083**	-.073*	-.072*	-.033	-.044
	(.032)	(.032)	(.032)	(.031)	(.031)
Age	-.002+	-.002+	-.003*	-.003**	-.006***
	(.001)	(.001)	(.001)	(.001)	(.001)
Urban	-.141***	-.119***	-.110***	-.073***	-.047**
	(.017)	(.018)	(.019)	(.018)	(.018)
Married	-.015	-.008	-.004	-.002	.003
	(.024)	(.024)	(.024)	(.023)	(.022)
Economic Conditions					
Occupation before age 60		-.032***	-.029***	-.021**	-.011
		(.008)	(.008)	(.008)	(.008)
Economic independence			-.053*	-.023	.023
			(.026)	(.025)	(.025)
Psychological Resources					
Optimism				-.269***	-.254***
				(.010)	(.010)
Making own decision				-.041***	-.034***
				(.008)	(.008)
Lifestyle					
Engagement					-.220***
					(.024)
Smoke					.026
					(.021)
Heavy drink					-.058+
					(.032)
Exercise					-.068***
					(.019)
Intercept	2.267	2.293	2.294	3.365	3.544
R^2	.017	.019	.019	.115	.128

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)

NOTE: Shown are metric coefficients with standard errors in parentheses.

Table 1.5. Low Life Quality in 2000 and 2002 Regressed on Education, Controlling for Sociodemographis (Model 1), Economic Conditions (Model 2), Psychological Resources (Model 3), Lifestyles (Model 4) and Loss of Social Connection (Model 5): Oldest Old Chinese

	Low life quality in 2000 (N=3993)					Low life quality in 2002 (N=1885)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Age	-.003	-.003	-.003	-.004	-.004	-.001	-.001	-.002	-.004	-.004
	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)
Female	.006	.012	.009	.010	.007	.074+	.067	.064	.034	.033
	(.030)	(.030)	(.030)	(.032)	(.032)	(.044)	(.045)	(.045)	(.048)	(.047)
Han	-.071	-.061	-.049	-.035	-.040	-.033	-.013	.007	.002	-.006
	(.048)	(.048)	(.048)	(.048)	(.048)	(.069)	(.069)	(.070)	(.069)	(.069)
Urban	-.109***	-.084**	-.083**	-.059*	-.064*	-.134***	-.078+	-.066	-.024	-.027
	(.027)	(.029)	(.029)	(.029)	(.029)	(.041)	(.043)	(.043)	(.044)	(.043)
Married	.062+	.071*	.072*	.076*	.100**	.032	.042	.047	.056	-.021
	(.034)	(.035)	(.034)	(.034)	(.037)	(.053)	(.053)	(.053)	(.053)	(.057)
Education	-.009*	-.004	-.003	.005	.004	-.015*	-.003	-.002	.007	.006
	(.004)	(.004)	(.004)	(.004)	(.005)	(.006)	(.007)	(.007)	(.007)	(.007)
Low life quality in 1998	.262***	.259***	.244***	.230***	.228***					
	(.018)	(.018)	(.019)	(.019)	(.019)					
Low life quality in 2000						.287***	.284***	.262***	.246***	.241***
						(.023)	(.023)	(.024)	(.024)	(.024)
Occupation before age 60		-.031*	-.031*	-.020	-.022		-.047**	-.045*	-.032+	-.032+
		(.012)	(.012)	(.012)	(.012)		(.018)	(.018)	(.018)	(.018)
Economic independence		-.019	-.021	.015	.003		-.120*	-.113*	-.078	-.096+
		(.039)	(.039)	(.039)	(.039)		(.057)	(.057)	(.057)	(.056)
Optimism (1998/2000)			-.069***	-.060***	-.061***			-.074*	-.054+	-.054+
			(.017)	(.017)	(.017)			(.031)	(.030)	(.030)
Making own decision (1998/2000)			.037**	.041**	.041**			-.023	-.011	-.013
			(.013)	(.013)	(.013)			(.017)	(.017)	(.017)

Table 1.5. Continued

	Low life quality in 2000 (N=3993)					Low life quality in 2002 (N=1885)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Engagement (1998/2000)				-.199***	-.193***				-.309***	-.303***
				(.038)	(.038)				(.056)	(.056)
Smoke (1998/2000)				.082*	.075*				.048	.049
				(.034)	(.034)				(.052)	(.052)
Heavy drink (1998/2000)				-.024	-.027				-.021	-.013
				(.052)	(.051)				(.085)	(.085)
Exercise (1998/2000)				-.043	-.044				-.049	-.049
				(.029)	(.029)				(.041)	(.041)
Loss of spouse (1998-2000)					-.092					
					(.066)					
Loss of family care (1998-2000)					.331***					
					(.069)					
Loss of spouse (2000-2002)										.268**
										(.087)
Loss of family care (2000-2002)										.279**
										(.092)
Intercept	1.993	2.040	2.180	2.513	2.512	1.843	1.964	2.388	2.904	2.952
R^2	.065	.066	.070	.079	.084	.094	.100	.104	.119	.128

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)
NOTE: Shown are metric coefficients with standard errors in parentheses.

Table 1.6. Cognitive functioning Regressed on Education and Female Controlling for Sociodemographics (Model 1), Education by Female Interaction (Model 2), Economic Conditions (Model 3), Current Economic Independency by Female Interaction (Model 4), Psychological Resources (Model 5), Lifestyles (Model 6), and Engagement by Female and Exercise by Female Interactions (Model 7): Oldest Old Chinese, 1998

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Female	-2.006***	-1.952***	-1.911***	-2.114***	-2.006***	-1.715***	-1.921***
	(.154)	(.154)	(.160)	(.177)	(.174)	(.180)	(.198)
Education	.152***	.110***	.098***	.110***	.097***	.007	.041
	(.020)	(.023)	(.026)	(.026)	(.025)	(.026)	(.026)
Female×		.162***	.163***	.114*	.109*	.074	-.026
Education		(.044)	(.044)	(.048)	(.047)	(.046)	(.049)
Occupation			.006	.023	-.031	-.132*	-.116*
before age 60			(.066)	(.067)	(.066)	(.065)	(.065)
Economic			.334	-.030	-.184	-.814**	-.453+
independence			(.213)	(.253)	(.248)	(.248)	(.255)
Female×Eco-				1.151**	1.121**	1.455***	.847*
Independence				(.428)	(.421)	(.415)	(.426)
Optimism					1.091***	.898***	.900***
					(.084)	(.084)	(.083)
Making					.538***	.450***	.431***
own decision					(.066)	(.066)	(.065)
Engagement						2.751***	2.062***
						(.205)	(.267)
Smoke						.520**	.511**
						(.178)	(.177)
Heavy drink						-.021	-.005
						(.271)	(.270)
Exercise						.903***	.455*
						(.155)	(.221)
Female×							1.725***
Engagement							(.394)
Female×							.936**
Exercise							(.308)
Han	.005	.008	-.007	-.009	-.519*	-.687**	-.726**
	(.262)	(.262)	(.263)	(.263)	(.260)	(.256)	(.256)
Age	-.320***	-.318***	-.316***	-.314***	-.307***	-.273***	-.268***
	(.009)	(.009)	(.009)	(.009)	(.009)	(.009)	(.009)
Urban	.490***	.468**	.394**	.412**	.203	-.113	-.189
	(.143)	(.143)	(.153)	(.153)	(.151)	(.150)	(.150)
Married	.328+	.354+	.320	.360+	.361+	.310	.354+
	(.194)	(.194)	(.195)	(.195)	(.192)	(.189)	(.188)
Intercept	23.969	24.051	24.015	24.107	24.635	24.431	24.612
R^2	.224	.226	.227	.227	.254	.279	.282

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests) NOTE: N=7784; Shown are metric coefficients with standard errors in parentheses.

Table 1.7. Optimism, Making Own Decision, and Engagement Regressed on Sex, Education, and Their Interaction, Adjusting for Sociodemographic characteristics: Oldest Old Chinese 1998

	Optimism	Making Own Decision	Engagement
Female	-.067**	-.064*	-.064***
	(.021)	(.026)	(.008)
Education	.018***	.012**	.041***
	(.003)	(.004)	(.001)
Female × Education	-.003	.015*	.004+
	(.006)	(.007)	(.002)
Sociodemographic Characteristics			
Han	.350***	.259***	.060***
	(.034)	(.044)	(.013)
Age	-.002	-.011***	-.012***
	(.001)	(.002)	(.001)
Urban	.148***	.225***	.161***
	(.019)	(.024)	(.007)
Married	.024	.001	.052***
	(.026)	(.033)	(.010)
Intercept	3.564	3.237	1.246
N	8017	7931	9015
R^2	.040	.040	.377

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)
NOTE: Shown are metric coefficients with standard errors in parentheses.

Table 1.8. Cognitive Functioning in 2000 and 2002 Regressed on Education, Controlling for Sociodemographics (Model 1), Economic Conditions (Model 2), Psychological Resources (Model 3), Lifestyles (Model 4) and Loss of Social Connections (Model 5): Oldest Old Chinese

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Age	-.282***	-.280***	-.280***	-.270***	-.271***	-.315***	-.307***	-.312***	-.298***	-.296***
	(.017)	(.017)	(.017)	(.017)	(.017)	(.028)	(.028)	(.028)	(.028)	(.028)
Female	-.987***	-.963***	-.944***	-.906***	-.882**	-1.091**	-.897*	-.864*	-.596	-.628
	(.261)	(.269)	(.269)	(.285)	(.284)	(.423)	(.435)	(.434)	(.457)	(.457)
Han	-.702+	-.748+	-.888*	-.955*	-.925*	-.662	-.701	-.739	-.710	-.671
	(.418)	(.419)	(.423)	(.422)	(.422)	(.653)	(.656)	(.659)	(.656)	(.656)
Urban	.134	-.039	-.100	-.292	-.259	.563	.226	.154	-.241	-.260
	(.235)	(.253)	(.253)	(.255)	(.255)	(.389)	(.412)	(.414)	(.416)	(.417)
Married	.275	.209	.223	.202	.182	.382	.295	.308	.239	.676
	(.304)	(.306)	(.306)	(.305)	(.331)	(.516)	(.517)	(.516)	(.513)	(.562)
Education	.074*	.043	.042	-.015	-.012	.142*	.084	.077	-.002	-.001
	(.036)	(.040)	(.040)	(.041)	(.041)	(.059)	(.065)	(.065)	(.066)	(.066)
Cognitive functioning in 1998	.495***	.494***	.484***	.468***	.469***					
	(.022)	(.022)	(.022)	(.022)	(.022)					
Cognitive functioning in 2000						.458***	.456***	.442***	.401***	.400***
						(.037)	(.037)	(.038)	(.038)	(.038)
Occupation before age 60		.115	.094	-.009	.002		.074	.064	-.053	-.065
		(.108)	(.108)	(.109)	(.109)		(.175)	(.175)	(.175)	(.175)
Economic independence		.431	.485	.079	.141		1.454**	1.405*	1.119*	1.157*
		(.341)	(.341)	(.344)	(.344)		(.551)	(.550)	(.548)	(.549)
Optimism (1998/2000)			.157	.084	.084			.970**	.735**	.744**
			(.146)	(.146)	(.146)			(.277)	(.277)	(.277)
Making own decision (1998/2000)			.287*	.263*	.263*			-.106	-.205	-.207
			(.112)	(.112)	(.112)			(.163)	(.163)	(.163)

Table 1.8. Continued

	Cognitive Functioning in 2000 (N=4356)					Cognitive Functioning in 2002(N=2087)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Engagement (1998/2000)				1.782***	1.742***				2.969***	2.947***
				(.335)	(.335)				(.542)	(.542)
Smoke (1998/2000)				-.698*	-.663*				-.262	-.257
				(.298)	(.298)				(.500)	(.500)
Heavy drink (1998/2000)				1.075*	1.096*				-.156	-.163
				(.456)	(.456)				(.819)	(.819)
Exercise (1998/2000)				.080	.083				.411	.421
				(.255)	(.255)				(.395)	(.394)
Loss of spouse (1998-2000)					-.038					
					(.589)					
Loss of family care (1998-2000)					-2.117***					
					(.598)					
Loss of spouse (2000-2002)										-1.627+
										(.849)
Loss of family care (2000-2002)										.228
										(.905)
Intercept	9.029	8.922	7.693	6.524	6.520	8.517	8.328	5.331	3.709	3.755
R^2	.257	.257	.259	.265	.267	.194	.197	.201	.213	.213

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)
NOTE: Shown are metric coefficients with standard errors in parentheses.

Table 2.1 Descriptive Statistics, Frequency Distributions, and Significance Tests in Means on Religious Participation across Key Variables (Oldest Old Chinese 1998)

	Mean/PCT.	Mean Levels of Religious Participation
Dependent Variable		
Religious Participation (1-3)	1.20 (0.49)	
Demographic Covariates		
75-89 (Ref.)	40.27	1.23
90-99	33.14	1.20**
100+	26.59	1.17***
Female	59.98	1.25***
Male	40.02	1.14
Urban	38.15	1.24***
Rural	61.85	1.18
Han	92.82	1.21***
Others	7.18	1.08
Socioeconomic Covariates		
Literate	33.01	1.19
Illiterate	66.99	1.21
Economic independent	17.74	1.20
Economic dependent	82.26	1.20
Lifestyles		
High Engagement	18.63	1.25***
Others	81.37	1.19
Exercise	27.35	1.26***
Others	72.65	1.18
Smoke	17.02	1.16***
Others	82.98	1.21
Heavy Drink	5.99	1.19
Others	94.01	1.20
Psychological Resources		
High Optimism	79.12	1.22*
Others	20.88	1.19
Self-autonomy	61.47	1.23**
Others	38.53	1.19
Social Resources		
Married	16.42	1.16***
Others	83.58	1.21
Family care when sick	91.76	1.20**
Others	8.24	1.26
Living arrangement		
Live with family members (Ref.)	84.92	1.19
live along	10.05	1.27***
live in the nursing home	5.03	1.25*

Table 2.1. Continued

	Mean/PCT.	Mean Levels of Religious Participation
Health Status		
No ADL problems	63.05	1.23***
Others	36.95	1.15
Cognitive intact	51.00	1.24***
Others	49.00	1.16
Good self-reported health	57.12	1.23***
Others	42.88	1.19
Good self-reported life quality	73.92	1.21
Others	26.08	1.21
Psychological well-being	54.05	2.23**
Others	45.95	1.19

Note: +p<.1; *p<.05; **p<.01; ***p<.001; Standard deviation is in parenthesis.

Table 2.2 Distress Regressed on Religious Participation Controlling for Sociodemographics (Model 1), Social Resources (Model 2), Psychological Resources (Model 3), and Health Lifestyle3 (Model 4) Oldest Old Chinese, 1998

	Model 1	Model 2	Model 3	Model 4
Religion	-.029*	-.032*	-.023+	-.012
	(.014)	(.014)	(.013)	(.013)
Social Resources				
Marital status		-.050*	-.046*	-.039*
		(.020)	(.019)	(.019)
Living with family		-.122***	-.111***	-.103***
		(.024)	(.023)	(.023)
Family care when sick		.029	.026	.032
		(.031)	(.029)	(.029)
Psychological Resources				
Optimism			-.209***	-.198***
			(.008)	(.008)
Making own decision			-.048***	-.042***
			(.007)	(.007)
Health Lifestyles				
Engagement				-.170***
				(.020)
Exercise				-.050**
				(.016)
Smoke				.001
				(.018)
Heavy drink				-.069*
				(.027)
ADL problems	.065***	.066***	.054***	.047***
	(.005)	(.005)	(.005)	(.005)
Education	-.019***	-.018***	-.013***	-.005*
	(.002)	(.002)	(.002)	(.002)
Han	-.195***	-.195***	-.104***	-.092***
	(.027)	(.027)	(.026)	(.026)
Age	.001	.001	.001	.001
	(.001)	(.001)	(.001)	(.001)
Female	.085***	.071***	.057***	.035*
	(.015)	(.016)	(.015)	(.016)
Urban	-.084***	-.087***	-.045**	-.012
	(.015)	(.015)	(.014)	(.015)
Intercept	2.810	2.904	3.785	3.921
R^2	.073	.078	.162	.173

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)
NOTE: N=7736; Shown are metric coefficients with standard errors in parentheses.

Table 2.3. Cognitive functioning Regressed on Religious Participation Controlling for Sociodemographics (Model 1), Social Resources (Model 2), Psychological Resources (Model 3), and Health Lifestyles (Model 4) Oldest Old Chinese, 1998

	Model 1	Model 2	Model 3	Model 4
Religion	.765***	.777***	.728***	.631***
	(.124)	(.124)	(.123)	(.122)
Social Resources				
Marital status		.408*	.376*	.308+
		(.183)	(.181)	(.179)
Living with family		.046	.054	-.028
		(.214)	(.212)	(.211)
Family care when sick		.408	.427	.357
		(.276)	(.272)	(.270)
Psychological Resources				
Optimism			.874***	.770***
			(.078)	(.078)
Making own decision			.393***	.334***
			(.062)	(.062)
Health Lifestyles				
Engagement				1.921***
				(.189)
Exercise				.262+
				(.146)
Smoke				.414*
				(.166)
Heavy drink				-.159
				(.254)
ADL problems	-1.551***	-1.552***	-1.489***	-1.421***
	(.042)	(.042)	(.042)	(.043)
Education	.176***	.171***	.150***	.066***
	(.019)	(.019)	(.019)	(.020)
Han	.144	.129	-.292	-.409+
	(.242)	(.242)	(.241)	(.240)
Age	-.222***	-.218***	-.217***	-.197***
	(.009)	(.009)	(.009)	(.009)
Female	-1.745***	-1.651***	-1.583***	-1.353***
	(.138)	(.143)	(.141)	(.149)
Urban	.619***	.654***	.437***	.110
	(.132)	(.110)	(.133)	(.136)
Intercept	23.825	23.283	18.935	17.286
R^2	.344	.345	.361	.371

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)
NOTE: N=7756; Shown are metric coefficients with standard errors in parentheses.

Table 2.4. Self-reported Bad Health and ADL Problems Regressed on Religious Participation Controlling for Sociodemographics (Model 1), Social Resources (Model 2), Psychological Resources (Model 3), and Health Lifestyles (Model 4) Oldest Old Chinese, 1998

	Self-reported bad health (N=7749)				ADL problems (N=7756)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Religion	-.064***	-.067***	-.049**	-.028	-.257***	-.252***	-.240***	-.199***
	(.019)	(.019)	(.018)	(.018)	(.033)	(.033)	(.033)	(.033)
Social Resources								
Marital status		.023	.028	.037		.012	.019	.035
		(.028)	(.026)	(.026)		(.049)	(.049)	(.048)
Living with		-.058+	-.044	-.039		.347***	.334***	.335***
family members		(.032)	(.031)	(.030)		(.057)	(.057)	(.056)
Family care		-.098*	-.098*	-.081*		-.282***	-.283***	-.252***
when sick		(.042)	(.040)	(.039)		(.074)	(.073)	(.072)
Psychological								
Optimism			-.319***	-.297***			-.139***	-.095***
			(.011)	(.011)			(.021)	(.021)
Making own			-.058***	-.046***			-.089***	-.066***
decision			(.009)	(.009)			(.017)	(.016)
Health Lifestyles								
Engagement				-.259***				-.398***
				(.027)				(.050)
Exercise				-.145***				-.402***
				(.021)				(.039)
Smoke				-.078***				-.160***
				(.024)				(.044)
Heavy drink				-.002				-.058
				(.037)				(.068)
Education	.002	-.002	.004	.017***	.011*	.009+	.013**	.037***
	(.003)	(.003)	(.003)	(.003)	(.005)	(.005)	(.005)	(.005)
Han	-.080*	-.082*	.047	.072*	.175**	.176**	.248***	.304***
	(.037)	(.037)	(.035)	(.035)	(.065)	(.065)	(.065)	(.064)
Age	.004**	.004**	.003*	-.001	.063***	.062***	.061***	.053***
	(.001)	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.002)
Female	.109***	.111***	.084***	.032	.319***	.326***	.310***	.196***
	(.021)	(.022)	(.020)	(.022)	(.037)	(.038)	(.038)	(.040)
Urban	-.030	-.043*	.016	.069***	.108**	.098**	.137***	.234***
	(.020)	(.020)	(.019)	(.020)	(.035)	(.036)	(.036)	(.036)
Intercept	2.473	2.617	3.895	4.091	.786	.743	1.516	1.798
R^2	.009	.011	.118	.139	.119	.123	.133	.158

+p<.10, *p<.05, **p<.01, ***p<.001 (2-tailed tests)

NOTE: Shown are metric coefficients with standard errors in parentheses.

Table 2.5. Logistic Regression Model of Mortality by Religious Participation Controlling for Sociodemographics (Model 1), Social Resources (Model 2), Psychological Resources—Optimism and Self-autonomy (Model 3), and Health Lifestyle—Engagement, Smoke, Heavy Drink, and Exercise (Model 4) Oldest Old Chinese, 1998-2000

	Odds Ratio (95% CI)			
	Model 1	Model 2	Model 3	Model 4
Religion	.85(.76-.94)**	.85(.76-.94)**	.85(.77-.95)**	.90(.81-1.00)+
Social Resources				
Marital status		.67(.57-.79)***	.67(.57-.79)***	.68(.58-.80)***
Living with family members		1.20(1.01-1.44)*	1.18(.99-1.42)+	1.21(1.00-1.45)*
Family care when sick		1.01(.80-1.28)	1.01(.79-1.28)	1.03(.81-1.30)
Psychological Resources				
Optimism			.94(.88-1.01)+	.98(.91-1.04)
Making own decision			.94(.89-.99)*	.96(.91-1.01)+
Health Lifestyles				
Engagement				.58(.48-.69)***
Exercise				.65(.57-.74)***
Smoke				1.14(.99-1.31)+
Heavy drink				.96(.77-1.19)
Self-reported bad health	1.37(1.29-1.46)***	1.38(1.30-1.47)***	1.34(1.26-1.43)***	1.28(1.20-1.37)***
Education	.95(.93-.97)***	.95(.94-.97)***	.95(.94-.97)***	.98(.97-1.00)***
Han	1.14(.94-1.39)	1.16(.95-1.41)	1.20(.98-1.46)+	1.26(.98-1.46)*
Age	1.10(1.09-1.11)***	1.10(1.08-1.10)***	1.10(1.08-1.10)***	1.08(1.04-1.54)***
Female	.67(.60-.75)***	.62(.55-.70)***	.62(.55-.70)***	.59(.52-.67)***
Urban	.88(.79-.98)*	.89(.80-.99)*	.91(.82-1.02)	1.03(.92-1.16)
-2Log likelihood	8895.73	8868.87	8857.97	8749.97

Note: +p<.10, *p<.05, **p<.01, ***p<.001; N=7750.

Table 3.1. Religious Participation Regressed on Gender, Two-level-SES, SES × Gender Interactions, and Controls

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Focal associations					
Female	.134***	.137***	.147***	.143***	.149***
	(.013)	(.013)	(.013)	(.013)	(.013)
Individual-level- SES					
Education	-.002	-.005*	-.010***	-.007***	-.006**
	(.002)	(.002)	(.002)	(.002)	(.002)
Community- level- SES					
Urban residence	.049***	.048**	.024+	.022+	.028*
	(.012)	(.012)	(.012)	(.012)	(.012)
Regional GDP Per Capita	.015***	.016***	.016***	.016***	.017***
	(.003)	(.003)	(.003)	(.003)	(.003)
Education × Female		.011**	.010**	.002	.003
		(.004)	(.004)	(.004)	(.004)
Psych-social resources					
Engagement			.116***	.061**	.052*
			(.017)	(.021)	(.021)
Optimism			.006	.001	-.001
			(.007)	(.011)	(.011)
Making own-decision			.015*	.011	.009
			(.006)	(.009)	(.009)
Engagement × Female				.141***	.132***
				(.032)	(.032)
Optimism × Female				.008	.007
				(.015)	(.015)
Decision × Female				.004	.004
				(.011)	(.011)
Physical Stressor					
Problems in ADL					-.024***
					(.004)
Basic controls					
Age	-.004***	-.004***	-.002**	-.002*	-.001
	(.001)	(.001)	(.001)	(.001)	(.001)
Han	.113***	.113***	.098***	.098***	.102***
	(.023)	(.023)	(.023)	(.023)	(.023)
Married	-.040*	-.038*	-.044**	-.039*	-.037*
	(.016)	(.016)	(.016)	(.016)	(.016)
Constant	1.381	1.371	1.254	1.235	1.121
R^2	.031	.032	.039	.041	.046

Note: +p<.1; *p<.05; **p<.01; ***p<.001; N=7819; Unstandardized regression coefficients with standard errors in parentheses.

Table 3.2. Distress Regressed on Religious Participation, Gender, SES, Psycho-social resources, Physical Stressor, and Controls

Variables	Model 1	Model 2	Model 3	Model 4
Focal associations				
Religion	-.049***	-.054***	-.029*	-.028*
	(.014)	(.014)	(.013)	(.014)
Female	.090***	.091***	.056***	.043**
	(.016)	(.016)	(.015)	(.015)
Individual level SES				
Education	-.017***	-.017***	-.004+	-.006**
	(.002)	(.002)	(.002)	(.002)
Neighborhood level SES				
Urban residence	-.076***	-.075***	-.001	-.010
	(.015)	(.015)	(.014)	(.014)
Regional GDP Per Capita	.005	.005	.003	.001
	(.004)	(.004)	(.004)	(.004)
Religion×Regional GDP per capita		.022**	.018*	.020**
		(.008)	(.007)	(.007)
Psych-social resources				
Engagement			-.210***	-.185***
			(.020)	(.020)
Optimism			-.209***	-.203***
			(.008)	(.008)
Making own-decision			-.043***	-.040***
			(.007)	(.007)
Physical Stressor				
Problems in ADL				.046***
				(.005)
Religion×Problems in ADL				-.021*
				(.010)
Basic controls				
Age	.004***	.004***	.001	-.002+
	(.001)	(.001)	(.001)	(.001)
Ethnicity	-.187***	-.180***	-.079**	-.088***
	(.028)	(.028)	(.027)	(.026)
Marital Status	-.071***	-.070***	-.054**	-.058**
	(.020)	(.020)	(.019)	(.019)
Constant	2.440	2.423	2.604	2.873
R^2	.052	.053	.158	.170

Note: +p<.1; *p<.05; **p<.01; ***p<.001; N=7799; Unstandardized regression coefficients with standard errors in parentheses.

Table 3.3 Cognitive Functioning Regressed on Religious Participation, Gender, Psycho-social resources, Physical Stressor, and Controls

Variables	Model 1	Model 2	Model 3	Model 4	Model5
Focal associations					
Religion	1.131***	.669**	.362	.581*	.329
	(.133)	(.247)	(.240)	(.254)	(.237)
Female	-2.152***	-2.142***	-1.829***	-1.833***	-1.433***
	(.154)	(.154)	(.150)	(.150)	(.140)
Individual level SES					
Education	.154***	.153***	.011	.008	.058**
	(.020)	(.020)	(.021)	(.021)	(.020)
Neighborhood level SES					
Urban residence	.441**	.441**	-.259+	-.258+	.053
	(.142)	(.142)	(.142)	(.142)	(.133)
Regional GDP Per Capita	-.008	-.007	.017	.016	.062+
	(.037)	(.037)	(.036)	(.036)	(.034)
Religion×Female		.651*	.753**	.551+	.463+
		(.293)	(.284)	(.294)	(.274)
Psych-social resources					
Engagement			2.749***	2.779***	2.048***
			(.195)	(.195)	(.183)
Optimism			.916***	.914***	.762***
			(.083)	(.083)	(.078)
Making own-decision			.464***	.459***	.351***
			(.066)	(.066)	(.061)
Religion×Engagement				-.835**	-.686*
				(.312)	(.291)
Physical Stressor					
Problems in ADL					-1.430***
					(.042)
Basic controls					
Age	-.316***	-.315***	-.278***	-.278***	-.197***
	(.009)	(.009)	(.009)	(.009)	(.009)
Han	-.150	-.157	-.806**	-.828**	-.551*
	(.268)	(.268)	(.262)	(.262)	(.245)
Married	.376*	.381*	.215	.206	.324+
	(.192)	(.192)	(.187)	(.187)	(.174)
Constant	53.273	53.156	50.497	50.483	42.209
R^2	.231	.232	.277	.277	.371

Note: +p<.1; *p<.05; **p<.01; ***p<.001; N=7819; Unstandardized regression coefficients with standard errors in parentheses.

Table 3.4 Cognitive Functioning Regressed on Religious Participation, Urban/Rural Residence, Psycho-social resources, Physical Stressor, and Controls

Variables	Model 1	Model 2	Model 3	Model 4	Model5
Focal associations					
Religion	1.131***	1.368***	1.101***	1.064***	.759***
	(.133)	(.182)	(.177)	(.178)	(.166)
Female	-2.152***	-2.153***	-1.843***	-1.843***	-1.441***
	(.154)	(.153)	(.150)	(.150)	(.140)
Individual level SES					
Education	.154***	.153***	.012	.009	.058**
	(.020)	(.020)	(.021)	(.021)	(.020)
Neighborhood level SES					
Urban residence	.441**	.456**	-.244+	-.251+	.060
	(.142)	(.142)	(.142)	(.142)	(.133)
Regional GDP Per Capita	-.008	-.010	.014	.014	.061+
	(.037)	(.037)	(.036)	(.036)	(.034)
Religion×Urban residence		-.505+	-.434+	-.179	-.204
		(.264)	(.256)	(.271)	(.253)
Psych-social resources					
Engagement			2.737***	2.773***	2.042***
			(.195)	(.195)	(.183)
Optimism			.916***	.914***	.762***
			(.083)	(.083)	(.078)
Making own-decision			.462***	.458***	.350***
			(.066)	(.066)	(.061)
Religion×Engagement				-.916**	-.733*
				(.320)	(.298)
Physical Stressor					
Problems in ADL					-1.431***
					(.042)
Basic controls					
Age	-.316***	-.316***	-.280***	-.279***	-.198***
	(.009)	(.009)	(.009)	(.009)	(.009)
Han	-.150	-.171	-.814**	-.831**	-.555*
	(.268)	(.268)	(.262)	(.262)	(.245)
Married	.376*	.376*	.210	.201	.321+
	(.192)	(.192)	(.187)	(.187)	(.174)
Constant	53.273	53.285	50.655	50.590	42.297
R^2	.231	.232	.276	.277	.371

Note: +p<.1; *p<.05; **p<.01; ***p<.001; N=7819; Unstandardized regression coefficients with standard errors in parentheses.

Table 3.5 Cognitive Functioning Regressed on Religious Participation, Regional GDP, Psycho-social resources, Physical Stressor, and Controls

Variables	Model 1	Model 2	Model 3	Model 4	Model5
Focal associations					
Religion	1.131***	1.084***	.845***	.934***	.629***
	(.133)	(.135)	(.131)	(.134)	(.125)
Female	-2.152***	-2.147***	-1.835***	-1.837***	-1.436***
	(.154)	(.153)	(.150)	(.150)	(.140)
Individual level SES					
Education	.154***	.155***	.014	.011	.060**
	(.020)	(.020)	(.021)	(.021)	(.020)
Neighborhood level SES					
Urban residence	.441**	.450**	-.248+	-.246+	.061
	(.142)	(.142)	(.142)	(.142)	(.133)
Regional GDP Per Capita	-.008	-.012	.011	.010	.058+
	(.037)	(.037)	(.036)	(.036)	(.034)
Religion×Regional GDP		.195**	.216**	.219**	.174**
		(.072)	(.070)	(.070)	(.066)
Psych-social resources					
Engagement			2.734***	2.774***	2.044***
			(.194)	(.195)	(.183)
Optimism			.921***	.918***	.765***
			(.083)	(.083)	(.078)
Making own-decision			.466***	.461***	.352***
			(.066)	(.066)	(.061)
Religion×Engagement				-.997***	-.822**
				(.302)	(.282)
Physical Stressor					
Problems in ADL					-1.428***
					(.042)
Basic controls					
Age	-.316***	-.315***	-.279***	-.278***	-.197***
	(.009)	(.009)	(.009)	(.009)	(.009)
Han	-.150	-.087	-.738**	-.757**	-.495*
	(.268)	(.269)	(.263)	(.263)	(.246)
Married	.376+	.383*	.217	.208	.326+
	(.192)	(.192)	(.187)	(.187)	(.174)
Constant	53.273	53.124	50.480	50.415	42.168
R^2	.231	.232	.27	.278	.371

Note: +p<.1; *p<.05; **p<.01; ***p<.001; N=7819; Unstandardized regression coefficients with standard errors in parentheses.

Table 3.6. Distress in Wave III (2002) Regressed on Distress in Wave I and II, Religion, Gender, SES, Psycho-social Resources, Stressors, and Controls at Baseline

Variables	Model 1	Model 2	Model 3	Model 4	Model5
Distress1 (1998)	.156***	.129***	.126***	.099**	.096**
	(.031)	(.030)	(.030)	(.032)	(.032)
Distress2 (2000)	.253***	.213***	.208***	.187***	.180***
	(.026)	(.026)	(.026)	(.026)	(.026)
Focal associations					
Religion		-.076*	-.073*	-.055	-.060+
		(.036)	(.036)	(.035)	(.035)
Female		.062	.076+	.057	.053
		(.042)	(.043)	(.042)	(.042)
Individual level SES					
Education		-.016**	-.007	.006	.004
		(.006)	(.007)	(.007)	(.007)
Neighborhood level SES					
Urban residence		-.243***	-.246***	-.201***	-.215***
		(.039)	(.039)	(.040)	(.040)
Regional GDP Per		.044***	.041***	.044***	.044***
		(.010)	(.010)	(.010)	(.010)
Distress2×Religion			.076+	.088+	.094*
			(.046)	(.045)	(.045)
Distress1×Education			.024**	.023**	.023**
			(.008)	(.008)	(.008)
Psych-social					
Engagement				-.293***	-.294***
				(.052)	(.052)
Optimism				-.041+	-.040
				(.024)	(.024)
Making own-decision				.034+	.033+
				(.019)	(.019)
Physical Stressor					
Problems in ADL					.001
					(.021)
Loss of spouse					.020
					(.077)
Loss of family care					.265***
					(.062)
Basic controls					
Age	.001	-.002	-.002	-.004	-.004
	(.003)	(.003)	(.003)	(.003)	(.003)
Ethnicity	.083	.079	.079	.078	.098
	(.067)	(.069)	(.069)	(.069)	(.069)
Marital status	-.099*	-.058	-.057	-.050	-.070
	(.048)	(.050)	(.050)	(.050)	(.064)
Constant	1.357	1.821	1.830	2.192	2.193
R^2	.079	.116	0.121	0.136	0.144

Note: +p<.1; *p<.05; **p<.01; ***p<.001; N=1839; Unstandardized regression coefficients with standard errors in parentheses.

Table 3.7. Cognitive Functioning in Wave III (2002) Regressed on Cognitive Functioning in Wave I and II, Religion, Gender, SES, Psycho-social Resources, Stressors, and Controls at Baseline

Variables	Model 1	Model 2	Model 3	Model 4	Model5
Cognitive Functioning in	.293***	.255***	.263***	.248***	.203***
	(.039)	(.040)	(.040)	(.041)	(.042)
Cognitive Functioning in	.287***	.287***	.286***	.276***	.271***
	(.028)	(.028)	(.028)	(.028)	(.028)
Focal associations					
Religion		.027	-.718	-.844+	-1.051*
		(.348)	(.502)	(.502)	(.503)
Female		-.963*	-1.001*	-.884*	-.788*
		(.415)	(.416)	(.415)	(.414)
Individual level SES					
Education		-.123*	-.123*	.012	.035
		(.058)	(.058)	(.062)	(.062)
Neighborhood level SES					
Urban residence		.494	.501	.133	.164
		(.378)	(.377)	(.389)	(.389)
Regional GDP Per Capita		.387***	.385***	.351***	.364***
		(.100)	(.100)	(.100)	(.100)
Cognitive Functioning 1			-.201*	-.205*	-.239*
×Religion			(.098)	(.097)	(.097)
Psych-social Characteristics					
Engagement				2.586***	2.515***
				(.516)	(.515)
Optimism				-.073	-.071
				(.232)	(.232)
Making own-decision				-.329+	-.333+
				(.182)	(.182)
Physical Stressor					
Problems in ADL					-.806***
					(.202)
Loss of spouse					-.205
					(.773)
Loss of family care					-.205
					(.626)
Basic controls					
Age	-.252***	-.250***	-.251***	-.233***	-.221***
	(.028)	(.028)	(.028)	(.028)	(.028)
Han	-1.453*	-1.453*	-1.406*	-1.422*	-1.262+
	(.663)	(.663)	(.662)	(.670)	(.670)
Married	1.017*	.268	.259	.213	.383
	(.477)	(.503)	(.503)	(.500)	(.644)
Constant	28.330	30.481	30.391	29.282	28.690
R^2	.200	.209	.210	.219	.223

Note: +p<.1; *p<.05; **p<.01; ***p<.001; N=2224; Unstandardized regression coefficients with standard errors in parentheses.

Figure 1.1. Conceptual Model of How Education Affects Psychological Distress and Low Life Quality of Elderly Chinese

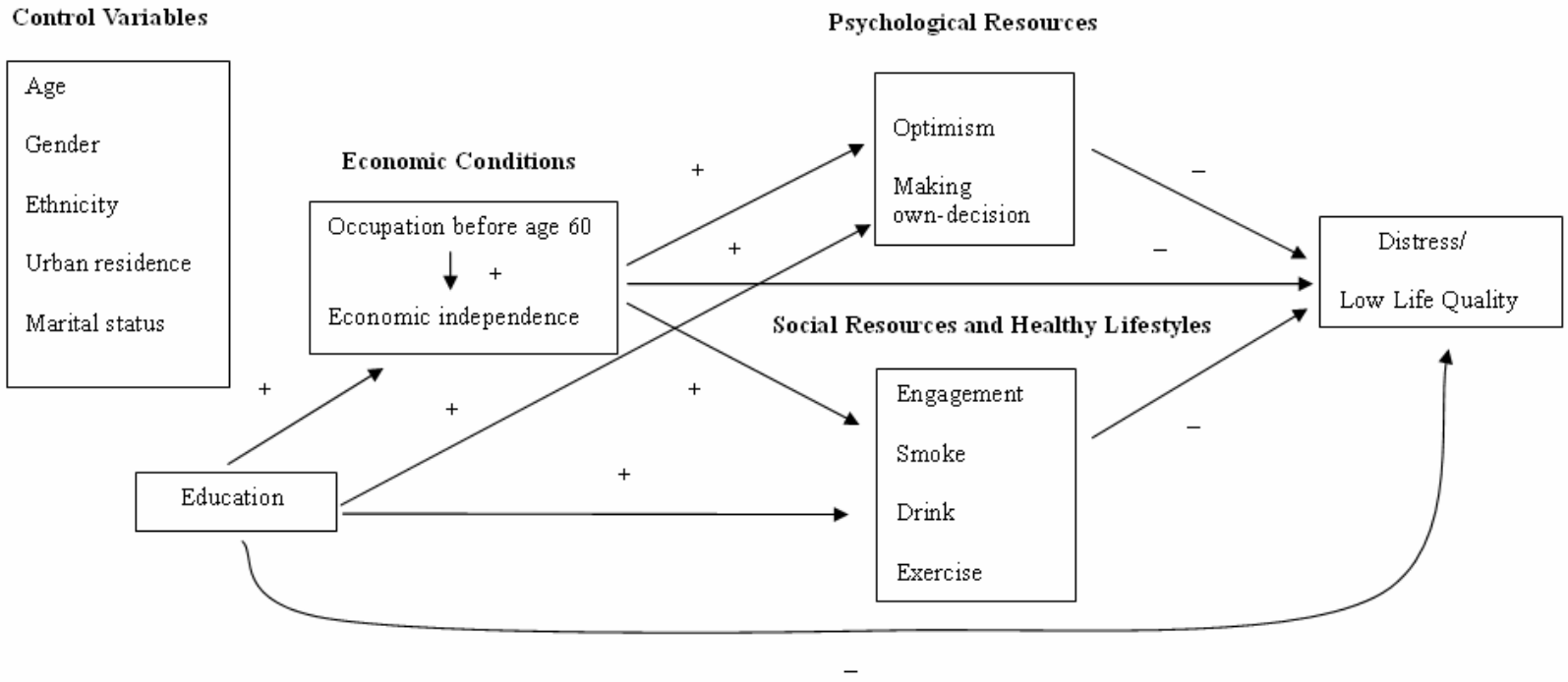


Figure 1.2. Conceptual Model of How Education Affects Cognitive Functioning of Elderly Chinese

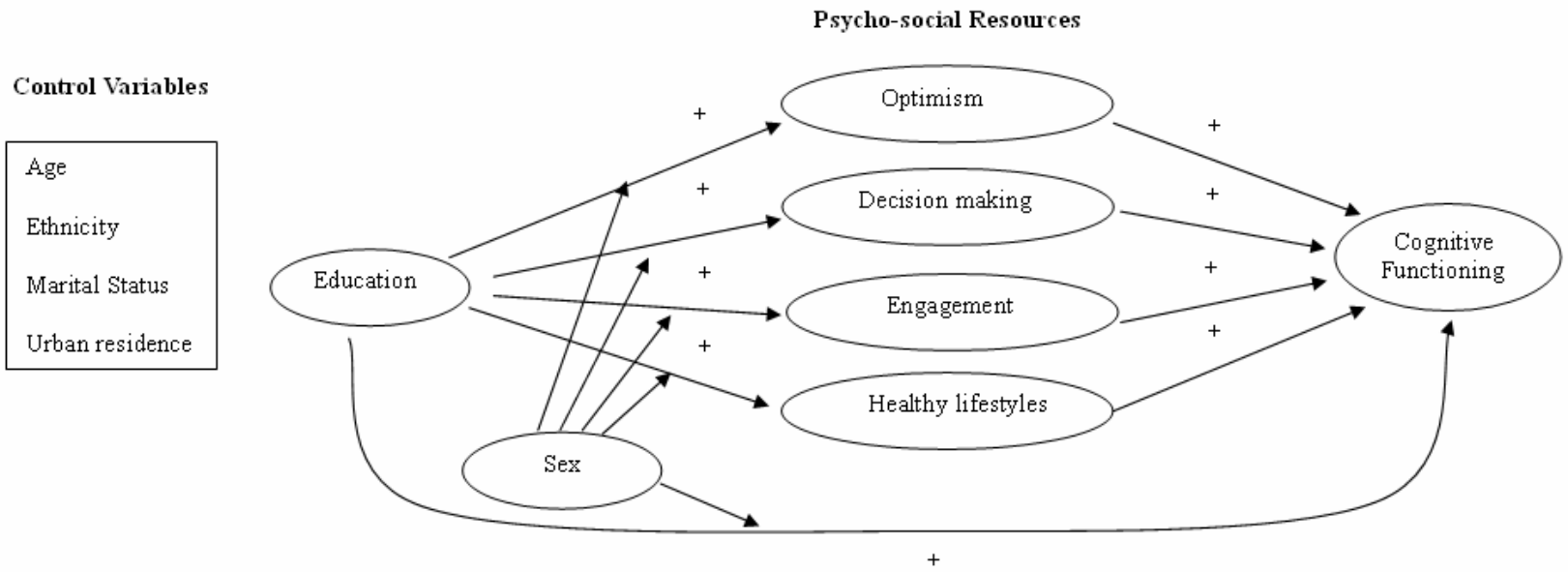


Figure 1.3. Cognitive Functioning by Education and Sex, Adjusting for Age, Han, Urban Residence, and Marital Status (See Table 1.6 for details)

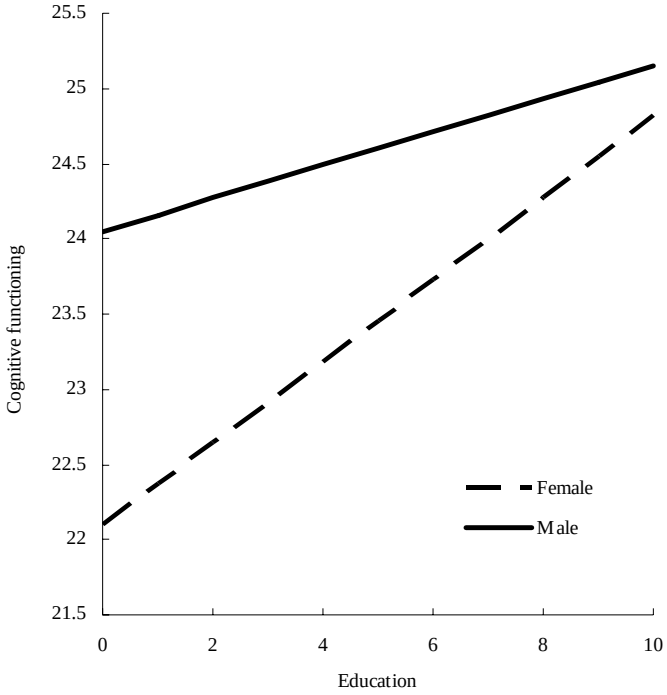
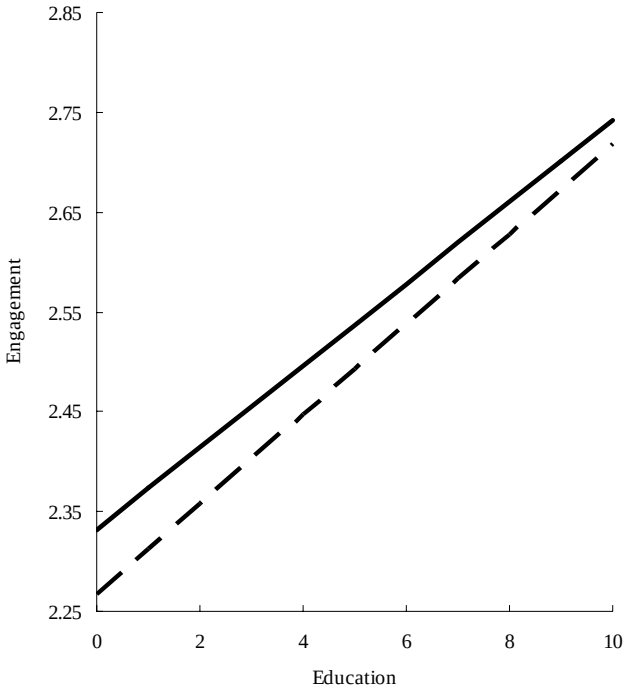


Figure 1.4. Engagement and Decision Making Predicted by Education for Females and Males, Adjusting for Age, Han, Urban Residence, and Marital Status (See Table 1.7 for details)



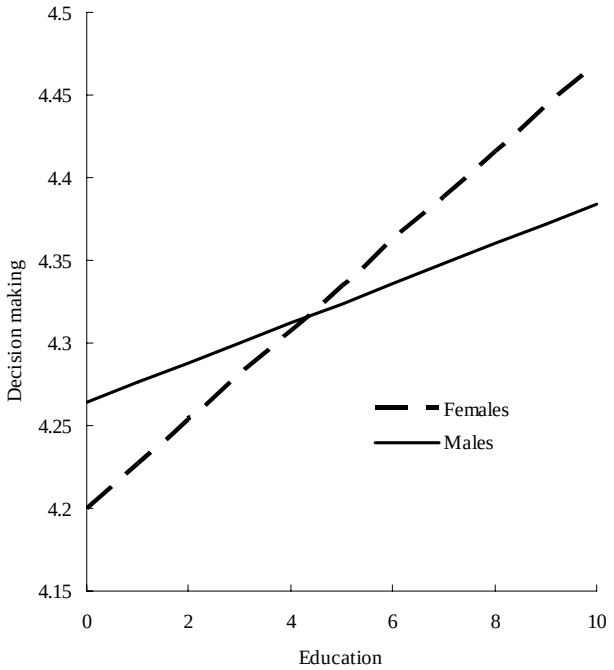


Figure 2.1. Illustration of How Congregational and Non-Congregational Religions Work Differently in Promoting Heath through the Life-Stress Paradigm (LSP)

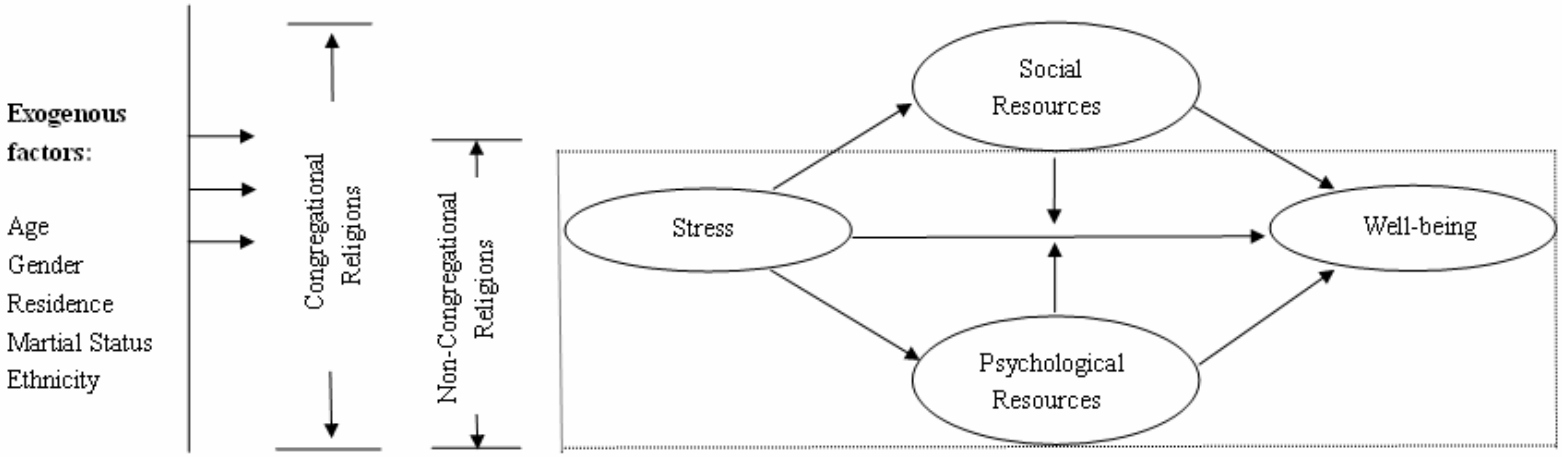


Figure 2.2. Conceptual Model on How Religion Affects Well-Being and Survival

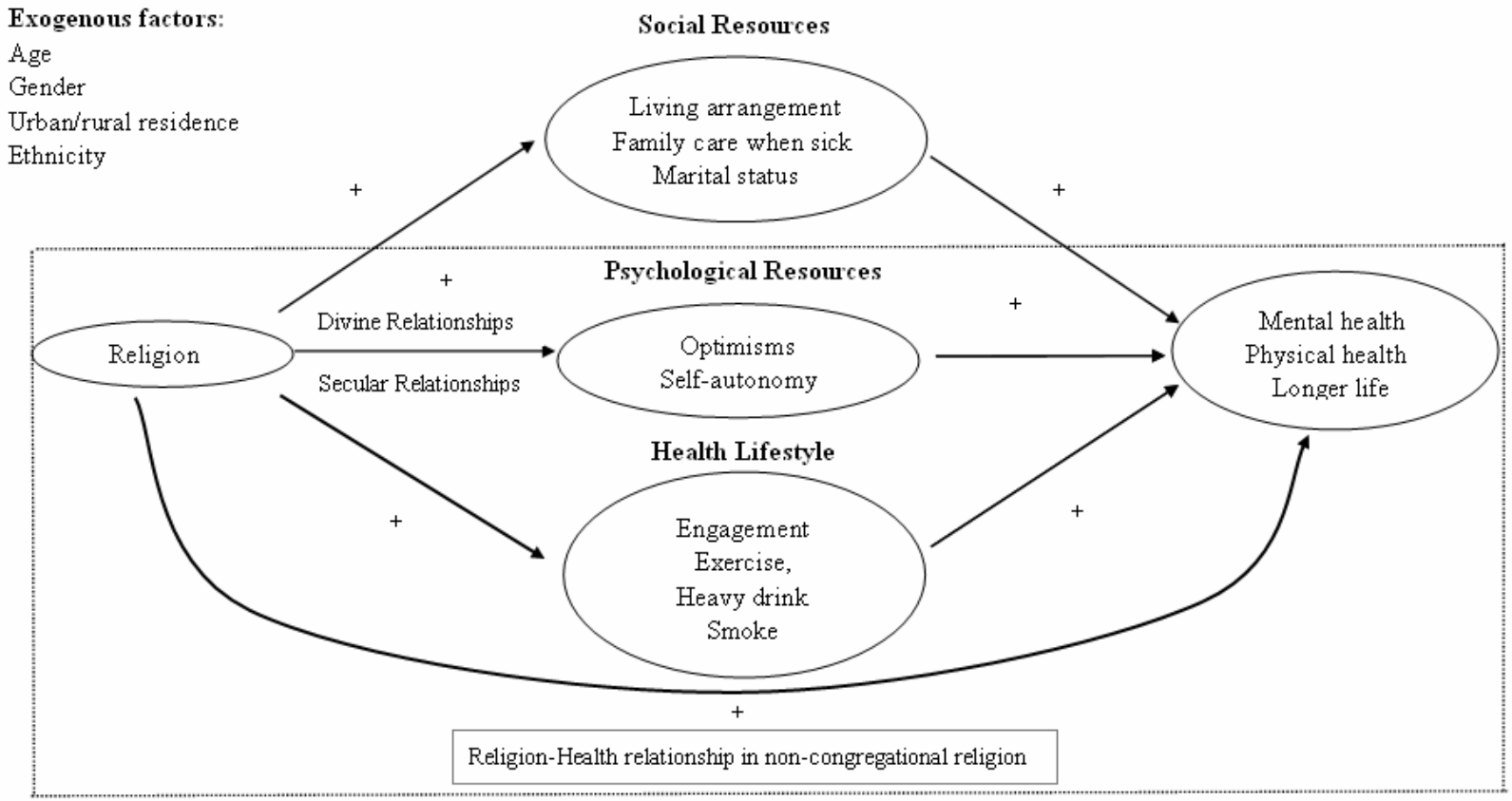


Figure 3.1. Conceptual Model of Chapter III

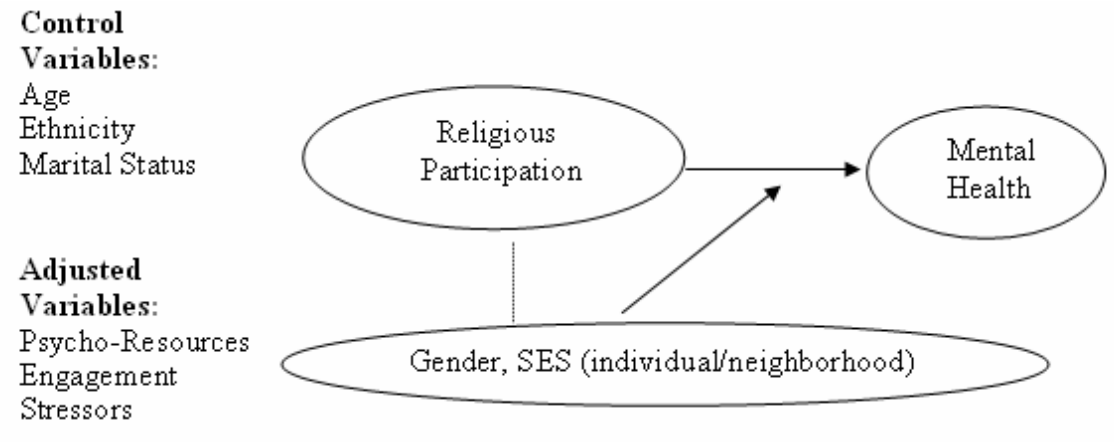


Figure 3.2. Adjusted Association between Education and Religious Participation by Gender (Model 2 of Table 3.1)

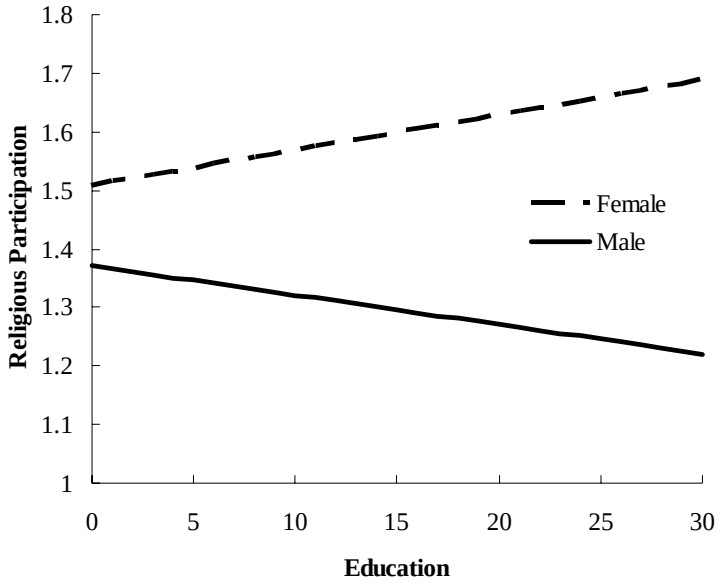


Figure 3.3. Adjusted Association between Engagement and Religious Participation by Gender (Model 4 of Table 3.1)

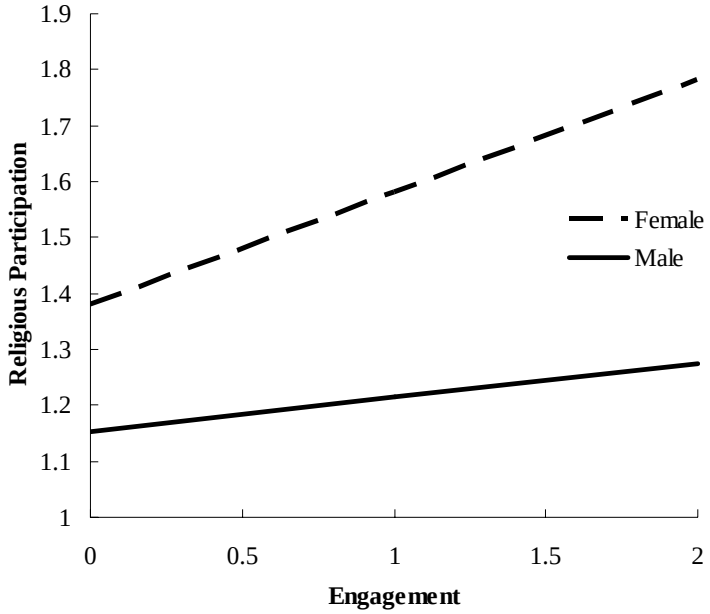


Figure 3.4. Adjusted Association between Religious Participation and Psychological Distress by Regional GDP (Model 2 of Table 3.2)

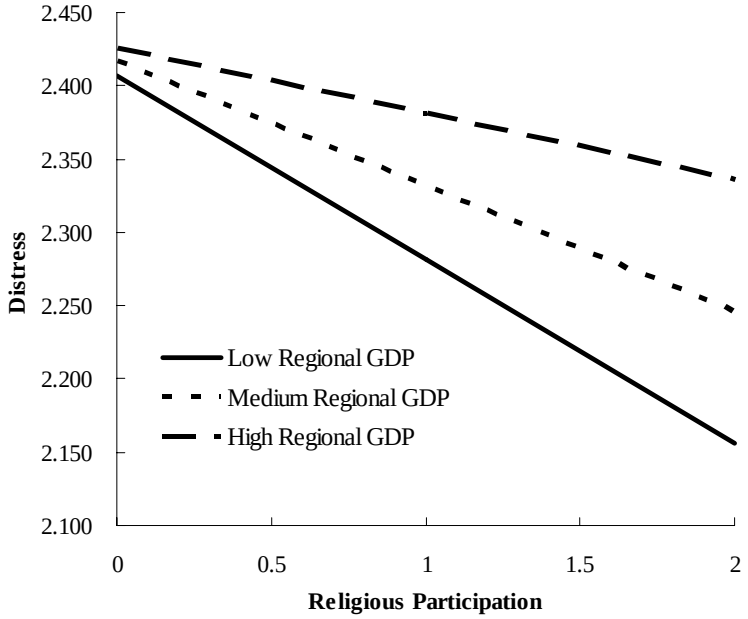


Figure 3.5. Adjusted Association between Religious Participation and Psychological Distress by Problems of ADL (Model 4 of Table 3.2)

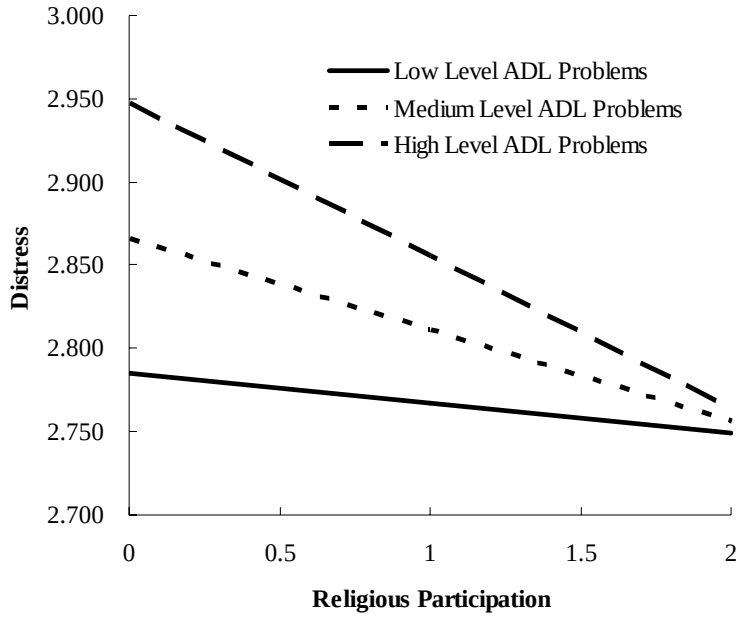


Figure 3.6. Adjusted Association between Religious Participation and Cognitive Functioning by Gender (Model 2 of Table 3.3)

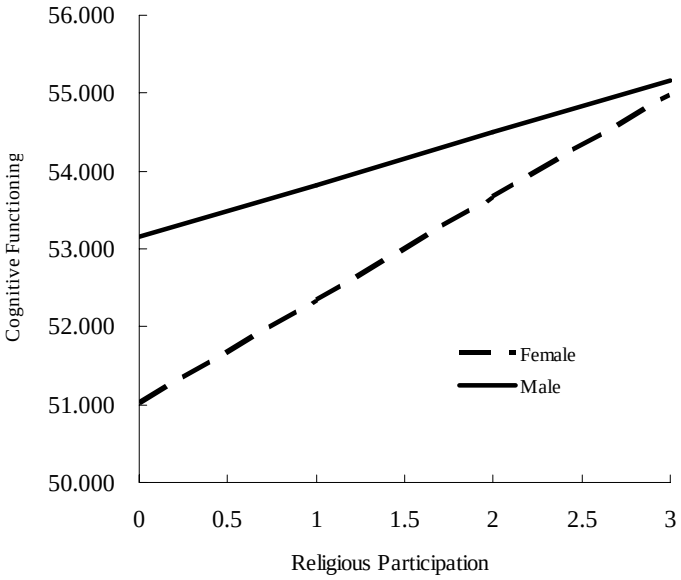


Figure 3.7. Adjusted Association between Religious Participation and Cognitive Functioning by Urban/Rural Residence (Model 2 of Table 3.4)

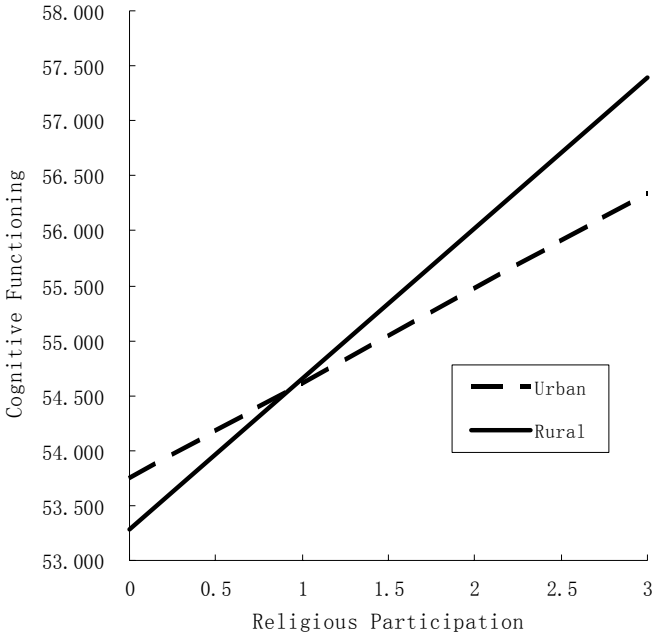


Figure 3.8. Adjusted Association between Religious Participation and Cognitive Functioning by regional GDP (Model 2 of Table 3.5)

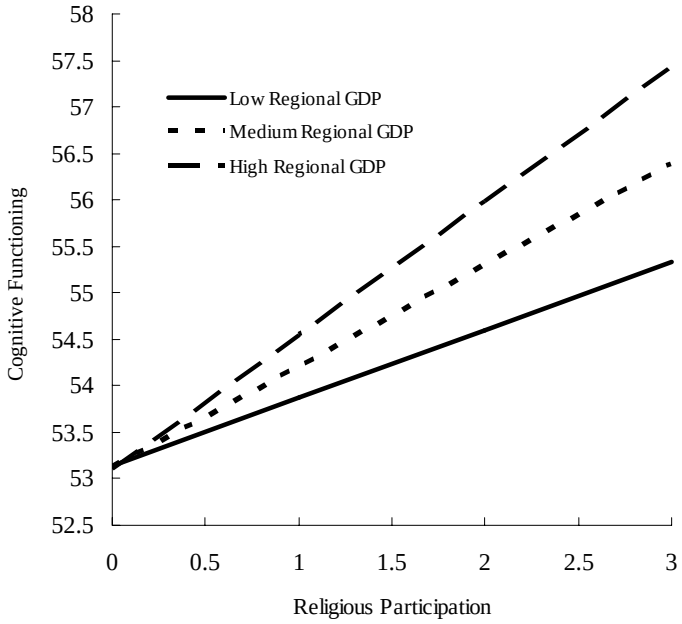


Figure 3.9. Adjusted Association between Distress2 and Distress3 by Religion (Model 3 of Table 3.6)

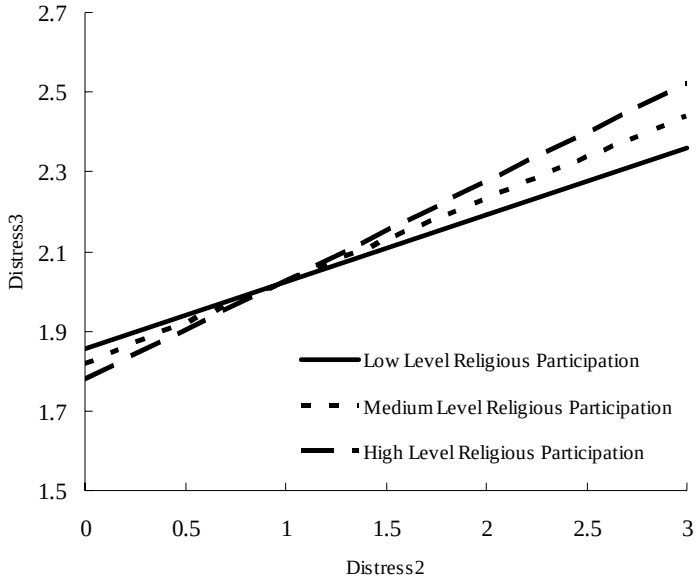
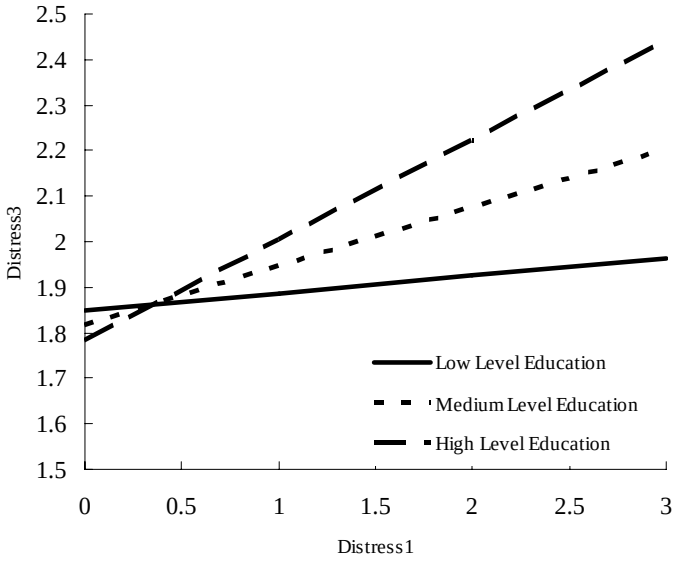


Figure 3.10. Adjusted Association between Distress1 and Distress3 by Education (Model 3 of Table 3.6)



Appendix

IN-DEPTH INTERVIEW SCRIPT

"Good morning/afternoon. I am _____ (introduce self)."

"This interview is designed to gather detailed information on the daily life of the elderly Chinese. I am especially interested in leisure activities that you are engaged in and how these activities might benefit your well-being. I appreciate your cooperation and help on this. If it is ok with you, I will be tape recording our conversation. The purpose of the recording is to provide me with all details, and at the same time be able to carry on an attentive conversation with you. I assure you that our conversation will remain confidential. I will be compiling a report which will contain all of your words and opinions without any reference to your individual identity. If you agree to this interview and the tape recording, please sign this consent form."

"Now, I'd like to start by having you briefly introduce yourself and your family. *(Note to interviewer: You may need to probe to gather the information you need)*."

"I'm now going to ask you some questions that I would like you to answer to the best of your ability. If you do not know the answer, please say so."

- "How many children do you have?" "Do you live with any of your children?"

(Note to the interviewer: If yes, probe—"How old is the child living with you?" "What's his/her profession?" "Was he/she retired?" "What's his/her educational attainment?")

- "Is this the place where you were born?"

(Note to the interviewer: If no, probe—"Where were you born?" "When did you move here and why?")

- "Are you able to read?"

(Note to the interviewer: If yes, probe— "How many years of schooling do you have?" "What kind of education do you have?" "What kind of techniques do you have and how did you get it?")

- "Do you have retirement salary?"

(Note to the interviewer: If yes, probe—"How much of it?" "What kind of job have you had before your retirement?")

- "Are you engaged in any kind of exercise?"

(Note to the interviewer: If yes, probe— "What specific kind of exercise?" "How often do you do that?" "Why do you do that?")

- "Besides exercise, are you engaged in any other activities?"

(Note to the interviewer: If yes, probe—"What are they?" "Why are you engaged in this/these activity/activities?")

- "Do you worship your ancestors or any of your dead family members?"

(Note to the interviewer: If yes, probe—"How often, why and how do you do that?" "When did you start to do that?")

- "Do you believe in any kind of supreme being or deity?"

(Note to the interviewer: If yes, probe—"what supreme being or diety do you believe in?" "Why do you believe that and how do you show respect for that deity or supreme being?" "When and why did you start to believe in the supreme being or deity?")

- "Do you have an altar in your home?"

(Note to the interviewer: If yes, probe—"what kind of divine image do you worship?" "How often do you worship it and why?" "When did you establish it and why?")

- "Do you go to temple/church?"

(Note to the interviewer: If yes, probe—"How often?" "Why do you go there?" "When is the first time you went to temple/church and why?" "Do you go there alone or with somebody else?" "How much time do you spend on specific practices when you go there?")

- "Do you pray in front of any deity?"

(Note to the interviewer: If yes, probe—"what is that deity?" "At what time will you pray?" "How often do you pray?" "What do you expect from the prayer?" "Were your prayers answered?" "Have you ever experienced a conversation with that deity?")

- "When you meet with major difficulties in your life, what do you do? And why?"
- "Are you afraid of death?" "Why/why not?"

BUDGET FORM

Description	Requested (for one year)
International Travel	
Airplane ticket to China	$1500
Field work (transportation fees and hotels)	$100 per day * 20 =$2000
Conference	$500
Other Direct Costs	
One Laptop	$1000
Four Digital Tape Recorders with unit prize as $110	$110*4=$440
Paper, pens, tapes, and other research supplies	$160
Incentives to the research participants $20 per person	$20*30=$600
Compensation for the field work assistants $200 per person	$200*5=$1000
Total Direct Costs	$7200
Total Direct and Indirect Costs	$7200
Amount of This Request	$7200

References

Adler, Nancy E., Thomas Boyce, Margaret A. Chesney, Sheldon Cohen, Susan Folkman, Robert L. Kahn, and S. Leonard Syme. 1994. "Socioeconomic Status and Health: The Challenge of the Gradient." *American Psychologist* 49: 15-24.

Allison, Paul J., Christophe Guichard, and Laurent Gilain. "A prospective investigation of dispositional optimism as a predictor of health-related quality of life in head and neck cancer patients." *Quality of Life Research* 9(8): 951-960.

Andrew, Frank M. and Audrey C. McKennell. 1979. "Measures of Self-Reported Well-Being: Their Affective, Cognitive, and Other Components." *Social Indicators Research* 8:127-55.

Aneshensel, Carol S. 1992. "Social Stress: Theory and Research." *Annual Review of Sociology* 18:15-38.

Arbuckle, Tannis Y., Gold, Dolores, and Andres, David. 1986. "Cognitive Functioning of Older People in Relation to Social and Personality Variables." *Journal of Psychology and Aging* 1:55-62.

Bassuk, Shari S., Thomas A. Glass, and Lisa F. Berkman. 1999. "Social Disengagement and Incident Cognitive Decline in Community-Dwelling Elderly Persons." *Annals of Internal Medicine* 131:165-173.

Bianchi, Suzanne M. and Daphne Spain. 1996. *Women, Work, and Family in America.* Washington, DC: Population Reference Bureau.

Buck, John Lossing. 1937. *Land Utilization in China, Statistics: A Study of 16,786 Farms in 168 Localities, and 38,256 Farm Families, in Twenty-two Provinces in China, 1929-1933.* Chicago: University of Chicago Press.

Butler, Robert N. and Myrna I. Lewis. 1982. *Aging & mental Health: Positive Psychosocial and Biomedical Approaches.* St. Louis: Mosby.

Cleverley, John. 1991. *The Schooling of China: Tradition and Modernity in Chinese Education.* Sydney, Australia: Allen & Unwin.

Cohen, Sheldon and Thomas Ashby Wills. 1985. "Stress, Social Support, and the Buffering Hypothesis." *Psychological Bulletin* 98: 310-357.

Coward, Howard. 1986. "Intolerance in the World's Religions." *Studies in Religion* 15:419-31.

Davin, Delia. 1975. “Women in the Countryside of China.” Pp. 243-73 in *Women in Chinese Society*, edited by M. Wolf and R. Witke. Stanford, CA: Stanford University Press.

Dean, Kenneth. 2003. “Local Communal Religion in Contemporary South-east China.” *The China Quarterly* 174: 338-358.

Dohrenwend, Bruce P., Itzhak Levav, Patrick Shrout, Sharon Schwartz, Guedaliz Naveh, Bruce Link, Andrew Skodol, and Ann Stueve. 1992. “Socioeconomic Status and Psychiatric Disorders: The Causation-Selection Issue.” *Science* 255:946-52.

Edelstein, Sharon L., Donna Kritz-Silverstein and Elizabeth Barrett-Connor. 1998. “Prospective association of smoking and alcohol use with cognitive function in an elderly cohort.” *Journal of Women’s Health* 7(10):1271-81.

Ellison, Christopher G. 1991. “Religious Involvement and Subjective Well-Being.” *Journal of Health and Social Behavior* 32:80-99.

Ellison, Christopher G. 1994. “Religion, Health, the Life Stress Paradigm, and the Study of Depression.” Pp.78-121 in Aging and Health: Theoretical Foundation and Methodological Frontiers, edited by J. Levin. Thousand Oaks, CA: Sage.

Ellison, Christopher G. and Jeff S. Levin. 1998. “The Religion-Health Connection: Evidence, Theory, and Future Directions.” *Health Education and Behavior* 25:700-720.

Elwood, P.C., J. E. Gallacher, C. A. Hopkinson, J. Pickering, P. Rabbitt, B. Stollery, C. Brayne, F. A. Huppert, and A. Bayer. 1999. “Smoking, drinking, and other life style factors and cognitive function in men in the Caerphilly cohort.” *Journal of Epidemiology and Community Health* 53: 9-14.

Erikson, Eric. 1959. “Identify and the Life Cycle.” New York: International University Press.

Fan, Lizhu. 2003. “Popular Religion in Contemporary China.” *Social Compass* 50(4): 449-457.

Ferraro, Kenneth F. and Jessica A. Kelley-Moore. 2000. “Religious Consolation Among Men and Women: Do Health Problems Spur Seeking?” *Journal for the Scientific Study of Religion* 39: 220-34.

Folstein, Marshal F., Susan E. Folstein, and Paul R. McHugh. 1975. “Mini-Mental State: A Practical Method for Grading the Cognitive State of Patients for the Clinician.” *Journal of Psychiatric Research* 12: 189-98.

Fox, A. J. P. O. Goldblatt, and D. R. Jones. 1985. “Social Class Mortality Differentials: Artifact, Selection or Life Circumstances.” *Journal of Epidemiology and Community Health* 38:1-8.

French, Howard W. 2007. “China Scrambles for Stability as Its Workers Age.” *New York Times,* March 22, A1, A8.

Friedman, Richard A. 2007. “Yet another Worry for Those Who Believe the Glass Is Half-Empty.” *New York Times,* January 9, D5.

Glock, Charles Y. 1964. “The Role of Deprivation in the Origin and Evolution of Religious Groups.” Pp. 24-36 in *Religion and Social Conflict,* edited by R. L. and M. E. Marty. New York: Oxford University Press.

Grigsby, Jill S. and Jay S. Olshansky 1989. “The Demographic Components of Population Aging in China.” *Journal of Cross-Cultural Gerontology* 4: 307-34.

Hall, Courtney D., Alan L. Smith, and Steven W. Keele. 2001. “The impact of aerobic activity on cognitive function in older adults: A new synthesis based on the concept of executive control.” *European Journal of Cognitive Psychology* 13(1-2): 279-300.

Hill, Terrence, Amy Burdette, Jacqueline Angel, and Ronald Angel. 2006. “Religious Attendance and Cognitive Functioning among Older Mexican Americans.” *The Journals of Gerontology: Psychological Sciences* 61:3-9.

Holzer, Charles E., Brent M. Shea, Jeffrey W. Swanson, Philip J. Leaf, Lerome K. Myers, Linda George, Myrna Weissman, Philip Bednarski. 1986. “The Increased Risk for Specific Psychiatric Disorders among Persons of Low Socioeconomic Status.” *American Journal of Social Psychiatry* 6: 259-71.

Holtzman, Ronald E.**,** George W. Rebok, Jane S. Saczynski, Anthony C. Kouzis, Kathryn Wilcox Doyle, and William W. Eaton**.** 2004. “Social Network Characteristics and Cognition in Middle-Aged and Older Adults.” *Journal of Gerontology: Psychological Sciences* 59B: 278-284.

Honig, Emily and Gail Hershatter. 1988. *Personal Voices: Chinese Women in the 1980’s.* Stanford, CA: Stanford University Press.

Hraba, Joseph, Frederick O. Lorenz, Zdenka Pechacova, and Qiang Liu. 1998. “Education and Health in the Czech Republic.” *Journal of Health and Social Behavior* 39(December): 295-316.

Hultsch, David F., Christopher Hertzog, Brent J Small, and Roger A Dixon. 1999. “Use It or Lose It: Engaged Lifestyle as A Buffer of Cognitive Decline in Aging.” *Psychology and Aging* 14:245-263.

Hummer, Robert A., Christopher G. Ellison, Richard G. Rogers, Benjamin E. Moulton, and Ron R. Romero. 2004. "Religious Involvement and US Adult Mortality: Review and Perspective." *Southern Medical Journal* 97: 1223-1230.

Hummer, Robert A., Rogers Richard G., Charles B. Nam, and Christopher G. Ellison. 1999. "Religious Involvement and U.S. Adult Mortality." *Demography* 36(2): 273-285.

Idler, Ellen L. and Stanislav Kasl. 1992. "Religion, Disability, Depression and the Timing of Death." American Journal of Sociology 97:1052-1079.

Idler, E. L., M. A. Musick, C. G. Ellison, L. K. George, N. Krause, M. G. Ory, K. I. Pargament, L. H. Powell, L. G. Underwood, and D. R. Williams. 2003. "Measuring Multiple Dimensions of Religion and Spirituality for Health Research." *Research on Aging* 25:327-65.

Inglehart, Ronald, Miguel Basanez, Jaime Diez-Medrano, Loek Halman, and Ruud Luijkx. 2004. *Human Beliefs and Values: A Cross-Cultural Sourcebook based on the 1999-2002 Values Surveys*. Mexico City: Siglo XXI.

Kalish, Richard A. 1976. "Death and Dying in a Social Context." Pp. 482-507 in *Handbook of Aging and the Social Sciences*, edited by R. H. Binstock and E. Shana. New York: Van Nostrand Reihold.

Marx, Karl and F. Engels. [1878] 1964. *On Religion.* New York: Schoken Books.

Kaneda, Toshiko. 2006. "China's Concern over Population Aging and Health." (Population Reference Bureau)

Koenig, Harold G. 1998. *Handbook of Religion and Mental Health*. New York: Academic Press.

Koenig, Harold G., Michael E. McCullough, and David B. Larson. 2001. *Handbook and Religion and Health.* New York: Oxford University Press.

Koenig, Harold G., Linda K. George, B.L. Peterson, C.F. Pieper. 1997. "Depression in medically ill hospitalized older adults: prevalence, characteristics, and course of symptoms according to six diagnostic schemes." *American Journal of Psychiatry* 154(10):1376-1383.

Koenig, Harold G., J.C. Hays, David B. Larson, Linda K. George, H.J. Cohen, Michael E. McCullough, K.G. Mneador, and D.G. Blazer. 1999. "Does Religious Attendance Prolong Survival? A Six-Year Follow-Up Study of 3,698 Older Adults." *Journal of Gerontology Series A: Biological Sciences and Medical Science* 54(7): M370-76.

Krause, Neal. 1986. “Social Support, Stress, and Well-Being Among Older Adults.” *Journal of Gerontology* 41:512-19.

Krause, Neal. 1995. “Religiosity and Self-esteem among Older adults.” *Journal of Gerontology: Social Sciences* 57BS332-47.

Krause, Neal. 2002. “Church-based Social Support and Health in Old Age: Exploring Variations by Race. *Journal of Gerontology: Social Sciences* 57B: S332-47.

Krause, Neal. 2003. “Religious Meaning and Subjective Well-Being in Late Life.” *Journal of Gerontology: Social Sciences* 58B(3): S160-S170.

Krause, Neal. 2005. “God-Mediated Control and Psychological Well-being in Late Life.” *Research on Aging.* 27: 136-64.

Krause, Neal. 2006. “Exploring Race and Sex Differences in Church Involvement during Late Life.” *International Journal for the Psychology of Religion* 16(2): 127-144.

Krause, Neal, A. Regula Herzog, and Elizabeth Baker. 1992. “Providing Support to Others and Well-Being in Later Life.” *Journal of Gerontology: Psychological Sciences* 47: 200-11.

Krause, Neal, Berit Ingersoll-Dayton, Jersey Liang, and Hidehito Sugisawa. 1999. “Religion, Social Support, and Health among the Japanese Elderly.” *Journal of Health and Social Behavior* 40: 405-421.

Lavely, William, Zhenyu Xiao, Bohua Li, and Ronald Freeman. 1990. “The Rise in Female Education in China: National and Regional Patterns.” *China Quarterly* 121:61-93.

Lazarus, Richard S., and Robert Launier. 1978. “Stress-Related Transactions between Person and Environment.” Pp. 287-327 in *Perspectives in International Psychology*, edited by L. Pervin and M. Lewis. New York: Plenum.

Lee, Liming. 2004. “The Current State of Public Health in China.”

Levin, Jeffrey S., Kyriakos S. Markides, and Laura.A.Ray. 1996. “Religious Attendance and Psychological Well-Being in Mexican Americans: A panel Analysis of Three Generations Data.” *The Gerontologist* 36: 454-63.

Liang, Jersey, Edward Jow-Ching Tu and Xiangming Chen. 1986. “Population aging in the People’s Republic of China.” *Social Science and Medicine* 23: 1353-1362.

Link, Bruce G. and Bruce Dohrenwend. 1998. “The Epidemiology of Mental Disorders.” Pp. 102-27 in *The Handbook of Medical Sociology*, edited by H. Freeman and S. Levine. Englewood Cliffs, N.J.: Prentice-Hall.

Maton, Kenneth I. 1989. “The Stress-Buffering Role of Spiritual Support: Cross-Sectional and Prospective Investigations.” *Journal for the Scientific Study of Religion* 28: 310-323.

McCullough, Michael E., William T. Hoyt, David B. Larson, and Harold G. Koenig, and Carl Thoresen. 2000. “Religious Involvement and Mortality: A Meta-Analytic Review” *Health Psychology* 19(3):211-222.

Miech, Richard A. and Michael J. Shanahan. 2000. “Socioeconomic Status and Depression over the Life Course.” *Journal of Health and Social Behavior* 41(June): 162-176.

Miech, Richard A., Avshalom Caspi, Terrie E. Moffitt, Bradley E. Wright, and Phil A. Silva. 1999. “Low Socioeconomic Status and Mental Disorders: A Longitudinal Study Selection and Causation During Young Adulthood.” *American Journal of Sociology* 104: 112-47.

Mirowsky, John and Catherine E. Ross. 1998. “Education, Personal Control, Lifestyle and Health: A Human Capital Hypotheses.” *Research on Aging: Special Issue on Education over the Life Course* 20:415-49.

Mirowsky, John and Catherine E. Ross. 2003. *Education, Social Status, and Health*. New York, NY: Aldine de Gruyter.

Mirowsky, John and Catherine E. Ross. 2003. *Social Causes of Psychological Distress*. New York: Aldine de Gruyter.

Musick, Marc. 1996. “Religion and Subjective Health Among Black and White Elders.” *Journal of Health and Social behavior* 37:221-237.

Musick, Marc A., John W. Traphagan, Harold G. Koenig, and David B. Larson. 2002. “Spirituality in Physical Health and Aging.” *Journal of Adult Development* 7(2): 73-86.

Musick, Marc A., James. S. House, and David R. Williams. 2004. “Attendance at Religious Service and Mortality in a National Sample.” *Journal of Health and Social behavior* 45:198-213

Neugebauer, Richard, Bruce P. Dohrenwend, and Barbara Dohrenwend. 1980. “Formulation of Hypotheses about the True Prevalence of Functional Psychiatric Disorders among Adults in the United States.” Pp. 45-49 in *Mental Illness in The United States: Epidemiological Estimates*, edited by B. P. Dohrenwend et al. New York: Praeger.

Newson, Rachel S. and Eva B. Kemps. 2005. “General Lifestyle Activities As a Predictor of Current Cognition and Cognitive Change in Older Adults: A Cross-Sectional

and Longitudinal Examination." *Journal of Gerontology: Psychological Sciences* 60B:113-120.

Overmyer, Daniel. 2002. "Comments on the Foundations of Chinese Culture in Late Traditional Times." Pp.313-342 in *Ethnography in China Today: A Critical Assessment of Methods and Results,* edited by D. L. Overmyer. Taipei: Yuan-Liou Publishing. Co. Ltd.

Pollner, Melvin. 1989. "Divine Relations, Social Relations, and Well-Being." *Journal of Health and Social Behavior* 30: 92-104.

Population Division, United Nations. 1999b. *World Population Prospects. The 1998 Revision Volume II: Sex and Age.* New York: United Nations.

Research Institute of All China Women's Federation and Research Office of Shaanxi Provincial Women's Federation. 1991. *Statistics on Chinese Women: 1949-1989.* Beijing: China Statistical Publishing House.

Reskin, Barbara F. 1988. "Bringing the Men Back in: Sex Differentiation and the Devaluation of Women's Work." *Gender and Society* 2(1): 58-81.

Ross, Catherine E. and John Mirowsky. 1995. "Does Employment Affect Health?" *Journal of Health and Social Behavior* 36: 230-243.

Ross, Catherine E. and John Mirowsky. 2006. "Sex Differences in the Effect of Education on Depression: Resource Multiplication or Resource Substitution." *Social Science and Medicine* 63(5): 1400-1413.

Ross, Catherine E. and Chia-ling Wu. 1995. "The Links Between Education and Health." *American Sociological Review* 60(5): 719-745.

Ross, Catherine E. and Chia-ling Wu. 1996. "Education, Age, and the Cumulative Advantage in Health." *Journal of Health and Social Behavior* 37(March): 104-120.

Ross, Catherine E. and Marieke Van Willigen. 1997. "Education and the Subjective Quality of Life." *Journal of Health and Social Behavior* 38(3): 275-297.

Scarmeas, Nikolaos and Yaakov Stern. 2003. "Cognitive Reserve and Lifestyle." *Journal of Clinical and Experimental Neuropsychology* 25:625-633.

Schieman, Scott. 2000. "Education and the Activation, Course, and Management of Anger." *Journal of Health and Social Behavior* 41(1): 20-39.

Schieman, Scott, Tetyana Pudrovska, Leonard I. Pearlin, and Christopher G. Ellison. 2006. "The Sense of Divine Control and Psychological Distress: Variations

Across Race and Socioeconomic Status." *Journal for the Scientific Study of Religion* 45(4): 529-549.

Shu, Xiaoling. 2004. "Education and Gender Egalitarianism: The Case of China." *Sociology of Education* 77: 311-336.

Smith, Timothy B., Michael E. McCullough, and Justin Poll. 2003. "Religiousness and Depression: Evidence for a Main Effect and the Moderating Influence of Stressful Life Events." *Psychological Bulletin* 129: 614-636.

Stacey, Judith. 1983. *Patriarchy and Socialist Revolution in China.* Berkeley: University of California Press.

Stark, Rodney, and Roger Finke. 2000. *Acts of Faith: Explaining the human side of religion.* Berkeley, CA: University of California Press.

Strawbridge, William J., Richard D. Cohen, Sarah J. Shema, and George A. Kaplan. 1997. "Frequent Attendance at Religious Services and Mortality over 28 Years." 1997. *American Journal of Public Health* 87:957-961.

Sun, Yiwei. 2007 "Religious Life Survey in the Contemporary China." Retrieved February 6, 2007 (http://www.news365.com.cn/xwzx/qkdd/200702/t20070206_1285142.htm).

Thompson, Laurence. G. 1989. *Chinese Religion: An Introduction.* Belmont, CA: Wadsworth Publishing Company.

Turner, Jay R., Blair Wheaton, and Donald A. Lloyd. 1995. "The Epidemiological of Social Stress." American Sociological Review 60:104-25.

Wang, Longde, Lingzhi Kong, Fan Wu, Yamin Bai, and Robert Burton. 2005. "Preventing Chronic Diseases in China." *Lancet* 366(9499): 1821-1824.

Wang, Y.C. 1960. "Western Impact and Social Mobility in China." *American Sociological Review* 25(6): 843-855.

Weller, Robert P., and Meir Shahar. 1996. "Introduction: Gods and Society in China." Pp.1-26 in *Unruly God: Divinity and Society in China*, edited by M. Shahar and R. P. Weller. Hunolulu: University of Hawaii Press.

Wheaton, Blair. 1978. "The Sociogenesis of Psychological Disorder: Reexamining the Causal Issue with Longitudinal data." *American Sociological Review* 43:383-403.

Wheaton, Blair. 1980. "The Sociogenesis of Psychological Disorder: An Attributional Theory." *Journal of Health and Social Behavior* 21:100-124.

Wolf, Margery. 1985. *Revolution Postponed: Women in Contemporary China.* Stanford, CA: Stanford University Press.

Woo, J., T. K. Wok, F. K. H. Sze, and H. J. Yuan. 2002. "Aging In China: Health and Social Consequences and Responses." *International Journal of Epidemiology* 31: 772-775.

Wu, Jing, Yuanli Liu, Keqin Rao, Qi Sun, Juncheng Qian, and Zhu Li. 2004. "Education-Related Differences in Health in Rural China." *American Journal of Public Health* 94 (10): 1713-1716.

Overmyer, Daniel L. 1985. *Religions of China.* New York: HarperCollins Publishers.

Ogawa, Naohiro.1988. "Aging in China: Demographic Alternatives." *Asia-Pacific Population Journal* 3: 21-64.

Quick J. D., D. L. Nelson, P. A. Matuszek, J. L. Whittington, and J. C. Quick. 1996. "Social Support, Secure Attachment, and Health." in *Handbook of Stress, Medicine, and Health*, edited by C. L. Cooper. Boca Raton, FL: CRC Press.

Schaie, Warner K. 1983. "The Seattle Longitudinal Study: A 21-Year Exploration of Psychometric Intelligence in Adulthood." Pp. 64-135 in *Longitudinal Studies of Adult Cognitive Development*, edited by K. Schaie. New York: Guilford Press.

Shu, Xiaoling. 2004. "Education and Gender Egalitarianism: The Case of China." *Sociology of Education* 77(4): 311-336.

Schaie, Warner K. 1983. "The Seattle Longitudinal Study: A 21-Year Exploration of Psychometric Intelligence in Adulthood." Pp. 64-135 in *Longitudinal Studies of Adult Cognitive Development*, edited by K. Schaie. New York: Guilford Press.

Strawbridge, William J., Richard D. Cohen, Sarah J. Shema, and George A. Kaplan. 1997. "Frequent Attendance at Religious Services and Mortality over 28 Years." 1997. *American Journal of Public Health* 87:957-961.

Swell, William H. and Robert M. Hauser. 1980. "The Wisconsin Longitudinal Study of Social and Psychological Factos in Aspirations and Achievements." *Research in Sociology of Education and Socialization* 1:59-99.

Van Ness, Peter H. and Stanislav V. Kasl. 2003. "Religion and Cognitive Dysfunction in an Elderly Cohort." *Journal of Gerontology: Social Sciences* 58B: S21-S29.

Vaupel, James W. and Yi Zeng. 1991. "Population Tradeoffs in China." *Policy Sciences* 24: 389-406.

Yang, C.K. 1961. *Religion in Chinese Society*. Berkeley: University of California Press.

Yang, Fenggang. 2004. “Between Secularist Ideology and Desecularizing Reality: The Birth and Growth of Religious Research in Communist China.” *Sociology of Religion* 65(2): 101-119.

Yang, Quanhe. 1988. “The Aging of China’s Population: Perspectives and Implications.” *Asia-Pacific Population Journal* 3(1): 55-74.

Zeng, Yi. 1989. “Aging of the Chinese Population and the Policy Issues: Lessons Learned from a Rural-Urban Dynamic Projection Model.” Pp. 81-101 in *Selected Paper for Publication in the IUSSP (International Union for Scientific Studies of Population) 22nd General Conference Volumes*. Liege: IUSSP.

Zeng, Yi. 1994. *China’s Population Trends and Strategies.* Peking University Press.

Zeng, Yi and Deqing Wu. 2000. “Regional Analysis of Divorce in China Since 1980.” *Demography* 37(2): 215-219.

Zeng, Yi and James W. Vaupel. 1989. “Impact of Urbanization and Delayed Childbearing on Population Growth and Aging in China.” *Population and Development Review* 15:425-445.

Zeng, Yi and James W. Vaupel. 2002. “Functional Capacity and Self-Evaluation of Health and Life of Oldest Old in China.” *Journal of Social Issues* 58:733-748.

Zeng, Yi, James W. Vaupel, Xiao Zhenyu, Zhang Chunyuan, and Liu Yuzhi. 2001. “The Healthy Longevity Survey and the Active Life Expectancy of the Oldest Old in China.” *Population: An English Selection* 13:95-116.

Zeng, Yi and Linda George. “Extremely Rapid Aging and the Living Arrangements of Older Persons: the Case of China.”1999. Technical Meeting on Population Aging and Living Arrangements of Older Persons: Critical Issues and Policy Responses. Population Division, Department of Economic and Social Affairs, United Nations Secretariat. New York: New York.

Zhang, Zhenmei. 2006. “Gender Differentials in Cognitive Impairment and Decline of the Oldest Old in China.” Journal of Gerontology: Social Sciences 61B(2): S107-115.

Zhou, Xueguang, Phyllis Moen, and Nancy Brandon Tuma. 1998. “Educational Stratification in Urban China: 1949-94.” *Sociology of Education* 71(July): 199-222.

Vita

Wei Zhang was born in Suzhou, Jiangsu province, P.R. China on Nov.12, 1977, the daughter of Zhongxing Zhang and Juzhen Zhou. After completing her B.A. and M.A. in Sociology at Nanjing University, China in 2002, she entered the Graduate School of The University of Texas at Austin to Pursue Ph.D. degree in Sociology. During her study at U.T., she received the master degree of Statistics in summer 2005.

Permanent address: 1020 Jackson Street Apt. 207, Albany, CA, 94706

This dissertation was typed by the author.